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AN ASSESSMENT OF AREAL AND TEMPORAL VARIATIONS IN STREAMFLOW QUALITY USING SELECTED DATA FROM THE NATIONAL STREAM QUALITY ACCOUNTING NETWORK

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Abstract

Streamflow chemical-quality data and stream-temperature data at 88 stations throughout the United States and Puerto Rico were analyzed to develop and to evaluate methodologies for the general assessment of the variation of the Nation's streamflow quality conditions in space and over time. The spatial variation is described by the use of sample statistics such as minima, maxima, and means of the variables at each station. The temporal variation is described by using nonparametric statistical testing procedures to assess time trends in the data at each station.

Evaluation of the coefficients (mean, amplitude, phase coefficient) derived by harmonic analysis of available daily stream-temperature records indicates adequate depiction of yearly seasonal variability and provides information relative to spatial variation in stream temperatures at most sites. Lowest harmonic amplitudes, which are indicative of little seasonal variability in stream temperature, were observed in Florida, along the eastern Gulf coast, and along the Pacific coast. Greatest annual variations in stream temperature exists in the Souris, Red (of the North), and Missouri River basins.

Temporal variations in stream temperature denoted by significant changes (at the 99 percent level of confidence) in annual harmonic coefficients were indicated at 15 of 80 stations used in the evaluation. Trends in stream temperature were found to exist at one or more stations in each of the six following areas: the Atlantic coast above Florida; Florida and the eastern Gulf; the Souris River, Red River of the North, and Missouri River basins; the Texas Gulf and Rio Grande area; the Colorado River basin; and the Pacific coast area.

Significant trends (at the 99 percent level of confidence) were found in the long-term streamflow chemical quality record at 15 of 88 stations analyzed. Of these stations, 10 showed an increase in levels of specific conductances while 5 showed a decrease. Trends were indicated for water-quality data from stations located in the following areas: the Atlantic coast above Florida; the Souris River, Red River of the North, and Missouri River basins; the Arkansas and Red River basins; the Texas Gulf and Rio Grande area; the Colorado River basin; and the Pacific coast area.

INTRODUCTION

An article in Science by Wolman (1971) expressed concern over quality of the Nation's rivers and questioned the adequacy of historical water-quality data for evaluating long-term changes in streamflow quality. This concern is shared by the Geological Survey, as illustrated by its principal role in the collection and interpretation of hydrologic data which are used by Federal, regional, State, and local "action" agencies in development of management plans for the Nation's water resources. To perform its function effectively and efficiently, the Survey must anticipate data demands and provide the action agencies with relevant information requisite to their water-resources planning and management decisions.

Other Federal and State agencies traditionally have carried out various forms of hydrological data-collection activities but generally not to the extent of nationwide station and water-quality variable coverage and systematic detail as done by the Survey for streamflow quality. Admittedly, the extent of water-quality variable coverage by the Survey until recent years has been limited as to the adequacy of the data base to provide information leading to better understanding of the complex physical processes (both natural and human-induced) affecting streamflow quality for certain types of problems. Nonetheless, several indicators of streamflow quality, available in the backfile of historical records, provide data useful for evaluating nationwide areal variations as well as long-term temporal changes.

Purpose and Scope

The purpose of this report is three-fold: (1) to describe analytical approaches for evaluating areal variations and temporal changes in both stream temperature and selected streamflow chemical-quality variables--nitrate, chloride, dissolved solids, specific conductance, and total hardness; (2) to tabulate and discuss results of the application of these procedures to available station records selected nationwide for assessment of present conditions as well as of temporal changes in stream quality, and (3) to delineate specific needs requiring further study.

The request for a national assessment was made specifically to the Geological Survey by the Council on Environmental Quality (CEQ) during November 1972. In assembling information for its fourth annual assessment, CEQ desired to expand upon its description of the Nation's water quality which for the previous (third) assessment had been provided largely by a report from Enviro Control, Inc. (1972).

After further discussions between personnel of CEQ and the Survey, it was finally determined in late January 1973 that the Survey would proceed with an assessment along the lines prescribed by CEQ, but that such an assessment would be carried out for an internal evaluation of operations of the Survey's National Stream Quality Accounting Network rather than solely for the purposes of CEQ. However, the time constraints placed upon CEQ's annual report limited the scope of this evaluation in terms of areal and data coverage to 88 stations as well as in terms of the analytical tools applied with the aid of the digital computer. In summary, this report is intended to describe and to document the products of the assessment which were carried out during February and March 1973 and a part of which were summarized in CEQ's fourth annual report (1973, pp. 283-284). Certain extensions or refinements of the results of this assessment or in the techniques applied will be discussed in a subsequent section in the report on future studies.

Station Selection

Station selection was based upon availability of records of streamflow-chemical quality rather than of stream temperature. Because the original approach to the assessment dictated limiting any analysis to those records of streamflow quality in computerized form, initial screening of available data was made using a station catalog compiled by the Office of Water Data Coordination (OWDC) (U.S. Geological Survey, 1972) followed by retrieval of the station records from the Water Quality File. For purposes of this assessment, station records were selected from those sites designated within the National Stream Quality Accounting Network (hereafter referred to as NASQAN) and operated by the U.S. Geological Survey. Of the 386 ongoing sites as of November 1972 (U.S. Geological Survey, 1972, appendix C), 261 stations are or have been operated under various Survey data-collection programs.

During the screening process, it was found that some qualification and considerably more detail was required than that provided by the OWDC catalog. For example, the catalog did not indicate interim discontinuance of station records, and several stations were found to have an intervening period when no data were collected. On the other hand, data records for a few of the stations included in the screening process extended beyond the period of record indicated by the catalog. Second, Survey station operation is commonly initiated at the beginning of a water year, so that the catalog's calendar year designations may actually indicate 3 or 9 months of temporal coverage.

As might be expected, the part of the published record stored in computerized form on the Water Quality File or Daily Values File varies greatly and coverage was particularly spotty at stations prior to the 1960 water year for both streamflow chemical quality and stream temperature. Based upon an arbitrary classification scheme for categorizing periods of record for each station record, the amount of data in computerized form comparable to that indicated by the OWDC Catalog was reduced as follows for the 261 Survey-operated stations:

Station Category:	A	B	C	D	X		Total
Class limits (years of record):							
(a) equal to or greater than	21	16	11	6	-	years	
(b) less than or equal to	-	20	15	10	5	years	
Basis:							
OWDC:	81	36	35	54	55		261
Computerized form:[1/]	9	6	35	38	173		261

1/ Based upon station years of data in the Water Quality File felt usable for an evaluation of long-term trends. Other miscellaneous measurements may have been included in the computerized file.

Based upon the above screening and the given purpose of the assessment study (p. 4) as well as the time constraints placed upon its execution, the assessment was limited to those 88 stations classified above as A, B, C, or D and having the bulk of data available in computerized form. This basis for station selection was admittedly quite arbitrary and, given the course of execution of the analytical aspects of the study, alternative modes of selection on a more rational basis might have been suggested. However, the 88 sites thus selected were felt to adequately represent the variety of water-quality conditions across the Nation. At most of these sites, data have been collected for a "sufficient"[2/] number of years at each site so that some evaluation of temporal changes could be carried out as a part of the assessment. It should be stressed, however, that any results expressed in the report are couched within the framework of those sites whose data were included in the analysis and that, using any other station configuration, the subsequent results expressed in the report might have been different.

Based upon the above screening process, the 88 selected stations are listed in appendix A. For purposes of this study, each station was given a sequential code number, ranging from "1" to "88." Geographical placement of the selected streamflow quality sites is indicated on figure 1.

No NASQAN station records were included in this assessment for the following six Water Resources Council (WRC) regions (U.S. Geological Survey, 1972): 04 - Great Lakes; 06 - Tennessee; 07 - Upper Mississippi; 16 - Great Basin; 19 - Alaska; 20 - Hawaii. The number of sampling sites for any one of the remaining 15 WRC regions ranged from 1 to 14 stations. A total of 64 of the 220 WRC subregions are represented by one or more stations in the assessment. Twenty-six States and Puerto Rico are represented. The greatest State representation included Texas and Florida, each with 14 sampling sites, reflecting in part the Survey's relatively large cooperative water-quality basic-data programs in these States. Of the total sites, 64 stations are located on streams west of the Mississippi River. A number of the long-term stations were originated as a part of the Survey's Irrigation Network begun in the 1930's. Particular areal

2/ This was determined by the sample sizes (period of record) of annual values necessary to perform the statistical tests.

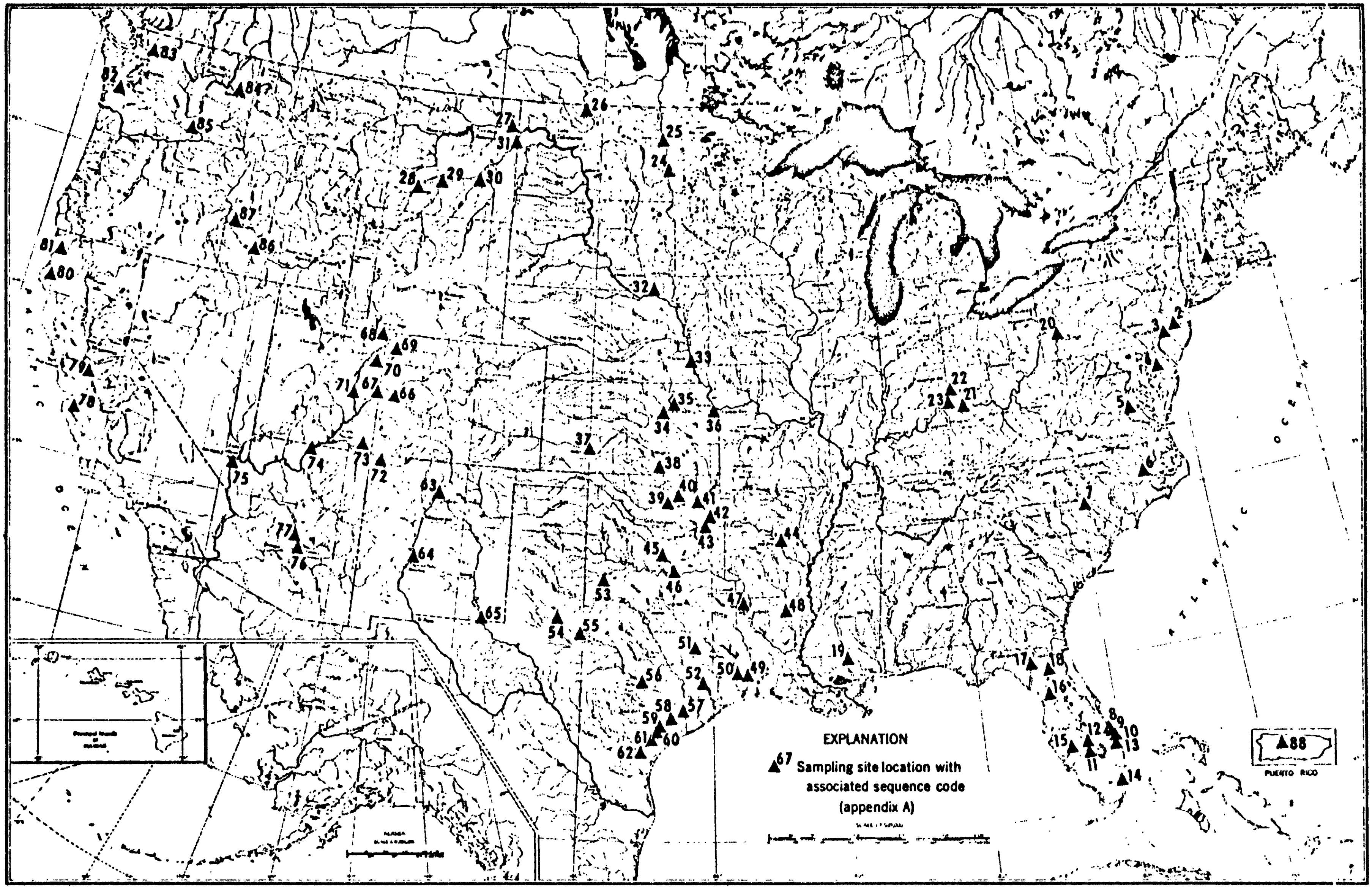

Figure 1.--Location of selected NASQAN stations used in the assessment.

deficiencies can be noted in the north central and southeastern States outside of Florida, a condition which can be attributed to relatively small Survey water-quality programs in these States.

Data Limitations

The assessment techniques summarized by this report consisted of three distinct components for utilizing water-quality data: (1) areal (nationwide) variations in streamflow chemical quality, (2) areal and temporal variations in stream temperatures, and (3) long-term changes in streamflow chemical quality. Although the first two components of the study were constrained by data available in computerized form, the data set for a third component, the evaluation or detection of significant time changes in streamflow chemical quality, was expanded through the use of published annual summaries of historical data. A brief description of the stepwise procedures used for each component of the assessment is given in appendix H. For purposes of this assessment, data records in computerized form for other water-quality variables such as sediment concentrations (daily), biologically-related variables (except for nitrates), and minor elements were judged to be insufficient in terms of areal coverage, frequency of sampling, or of period of record.

For the first component, available chemical analyses for each station in computer storage for the 1966-72 water-year period were used directly in formulating statistics for evaluating areal variations in current water-quality conditions for the sites included in the assessment. This length of record (7 years) was selected in order to obtain a sufficiently large sample size (in terms of numbers of determinations) at each site for the variables of interest and hopefully to average out short-term hydrologic fluctuations (such as extreme wet or dry years) which might appreciably affect the resultant statistics. For several of the stations, chemical analyses were not available for one or more of years covered by the selected period. Particularly for recent years (commonly for 1972, and occasionally for 1971), stream discharges representative of time of sampling may not have been included in a station's data matrix. Data sets were edited so that any data outliers judged attributable to errors in key punching or in transcribing the data values were eliminated from the analysis.

For the second component, in order to evaluate areal variability and temporal changes in stream temperatures at the selected sites, daily records available from the Daily Values File were utilized. Most of these daily records consisted of once daily measurements or daily mean values derived from continuous recorders. A few station-year records were reported as daily maximum or minimum determinations rather than as daily mean values. Station-year daily records of stream temperature available in computerized form and used in the assessment are summarized in appendix B-1. A total of 780 years of daily stream temperatures were used in the analysis for 80 of the 88 sites selected for the assessment; hence, an average of 9.8 years of record were available for the 80 stations.

The daily records of stream temperature frequently had missing daily values or gaps in the record, and analysis of the data had to take into account these data deficiencies, especially because these deficiencies were not systematically distributed throughout the records.

For the third component, in order to evaluate long-term changes in streamflow chemical quality, specific conductance was selected as the index of overall chemical quality conditions (Steele and Matalas, 1971), and annual mean discharge-weighted statistics were obtained from the available records at each of the 88 sampling sites selected by the procedure described in the previous section. A part of these records were in computerized form and the resultant chemical analyses were stored in the Water Quality File. Where appropriate, the annual summary tables from designated records retrieved from computer storage were used, particularly for station records not yet published and for station-years of monthly or periodic grab samples (see below) for which no annual summaries were published. Station records were supplemented with published annual summaries of chemical analyses from composited samples for those numerous station records not in computer storage.

The available records of streamflow chemical quality for the 88 NASQAN stations selected for the assessment are designated in appendix B-2. The letter codings used in the appendix (see explanation in appendix) designate the several types of streamflow chemical data. In an evaluation of long-term changes, the need for a common statistical measure of change in the mean for an annual time series is indicated by the changes in station operation over time. For example, at numerous sites chemical analyses have been obtained over the past 3-5 years for grab samples approximately on a monthly frequency (designated by "M" in appendix B-2) rather than on daily composited samples (designated by "C" in appendix B-2).

In the evaluation of long-term changes, confidence bounds of the annual mean discharge-weighted values vary greatly according to the sample sizes (hence, time coverage) used to compute the values (see, for example, Steele, 1971, fig. 2). It is noted from the summary table that annual summaries were not available for numerous station years due to the following causes: (1) corresponding discharge values for some or all samples during a given station year were missing, (2) errors in data from which the summary was derived, (3) no summary table was provided (either published or retrieved from computer storage), (4) sampling represented only part of the year, or (5) only miscellaneous analyses were determined.

The number of years of "usable" record (indicated in appendix B-2 as NYRS) for each station gives the maximum potential years of record judged amenable for analysis and evaluation of long-term changes. For the 86 NASQAN stations having concurrent measurements of stream discharge it includes those station years having codes "C", "M", "X" (periodic grab samples), or "Y" (mixed composite/grab samples) in appendix B-2. Two stations (03276600 and 03277200, code numbers 22 and 23) in the Ohio River basin had no discharge records concurrent with water-quality samples.[3/] Hence, annual time-series at these two sites were time-weighted rather than discharge-weighted. Station years of record for evaluation of long-term changes totaled nearly 1500 for the 88 sampling sites. The actual number of years may be lower in some cases due to missing annual mean values of either stream discharge or specific conductance. In particular, specific conductances were not reported for some stations whose records begin prior to 1946.

3/ Daily discharge records are reported for Survey station 03277200 (code 23) beginning in May 1970.

THE INTERNATIONAL SYSTEM OF UNITS AND CONVERSION FACTORS

For those readers interested in using the International Systems of Units (SI), metric equivalents of English units of measure are given below. The English units used in this report may be converted to metric units by the following conversion factors:

From Unit	From Abbreviation	Multiply by	To Obtain Unit	To Obtain Abbreviation
feet	(ft)	0.3048	metres	(m)
miles	(mi)	1.609	kilometres	(km)
square miles	(mi^2)	2.590	square kilometres	(km^2)
cubic feet per second	(ft^3/s)	.02832	cubic metres per second	(m^3/s)
inches	(in)	25.4	millimetres	(mm)

APPROACH

Two dimensions are considered in the assessment: (1) areal variations, and (2) long-term changes over time. Due to limitations of data available for the study for the selected stations, products of the assessment will be described in terms of (1) streamflow chemical quality, and (2) stream temperature. In this section, the analytical and statistical procedures applied to the several types of data will be discussed.

Areal Breakdown

For purposes of describing results of the assessment, particularly for the areal variations, the Nation was divided into eight areas. One station in Puerto Rico was allocated to a ninth area. These areas generally followed along major basin divisions, and each area with one exception consisted of one or more of the designated WRC regions (U.S. Geological Survey, 1972). The area designations for purposes of this assessment and the stations and WRC regions represented in each area are given in table 1. The area designations are presented graphically on figure 2. It should be noted in table 1 and figure 2 that the following WRC regions are not represented by stations in this study:

Region	Name
04	Great Lakes
06	Tennessee
07	Upper Mississippi
16	Great Basin
19	Alaska
20	Hawaii

Table 1.--Designation of areas for purposes of describing spatial and temporal water-quality conditions

Area designation	Range in sequence codes	Number of stations	Description of area	WRC Regions	USGS Parts
I	1-7	7	Atlantic Coast (above Florida)	01,02,03 1/	01,02 2/
II	8-19	12	Florida and Eastern Gulf	03 3/	02
III	20-23	4	Ohio River basin	05	03
IV	24-36	13	Souris, Red, and Missouri River basins	09, 10	05, 06
V	37-48	12	Arkansas and Red River basins	08, 11	07
VI	49-65	17	Texas Gulf and Rio Grande	12, 13	08
VII	66-77	12	Colorado River basin	14, 15	09
VIII	78-87	10	Pacific Coast	17, 18	11-13
IX	88	1	Puerto Rico	21	50
Total number of stations -		88			

Notes:

1/ NASQAN stations in WRC subregions 02 and 04 of WRC region 03 are included in area I.

2/ USGS stations 02083500 and 02129000 are included in area I.

3/ NASQAN stations in WRC subregions 09, 10, 11, and 18 of WRC region 03 are included in area II.

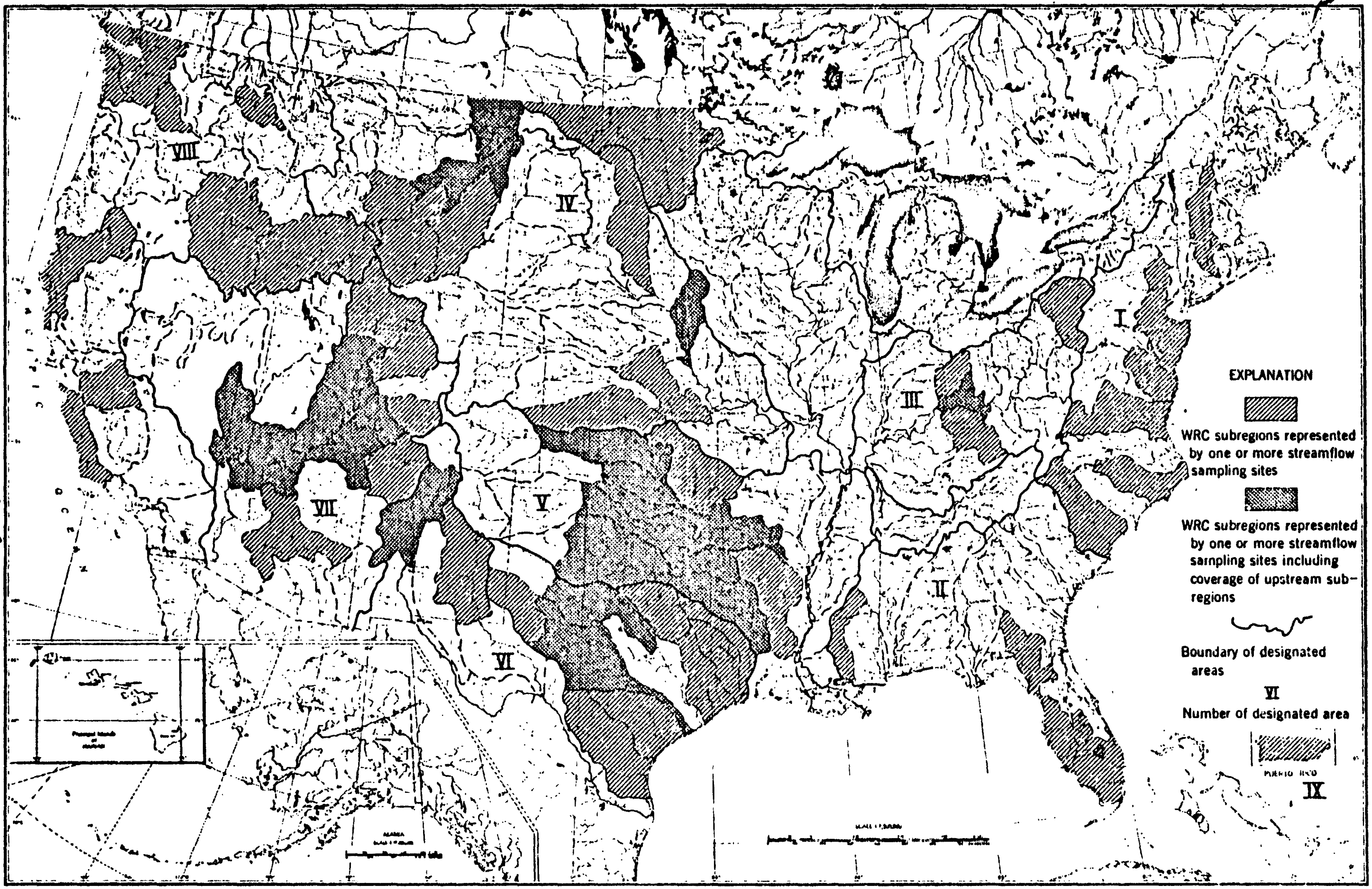

Figure 2. Delineation of areas used for summarizing results of the assessment.

Stations in WRC region 03 were split into areas I and II for purposes of this assessment, because two streams (see note 2, table 1) in the northern part of that region had chemical-quality and thermal characteristics more similar to area I (hence, WRC regions 01 and 02). The range of station sequence codes for each area (table 1) can be tied to the information given in appendix A and is shown graphically in figures 1 and 2.

Given the total number of years of "usable" data (as described in the previous section) for purposes of evaluating long-term changes in streamflow chemical quality, the areal distribution of the 88 selected NASQAN stations by period-of-record classification is given in table 2. The lengths of record given in this table reflect (1) the supplemental annual summary data obtained from Survey basic-data publications to extend those parts of station records found in computerized form (p. 7) and (2) the ommission of a few station-years of record judged to be inadequate after screening and editing of the data. Most class "A" stations (having 21 or more years of records) are concentrated in areas IV and VII (table 2). Many of these sampling sites formerly were included in the Survey's Irrigation Network. Class "D" and "X" stations are predominantly in areas I through VI; these station records are of marginal utility in evaluating long-term trends by virtue of small sample sizes (in terms of annual time series).

Table 2.--Classification of available records on streamflow chemical quality for assessment of long-term changes

Class and Period of Record, N, in Years

ea	A $N \geq 21$	B $16 \leq N \leq 20$	C $11 \leq N \leq 15$	D $6 \leq N \leq 10$	X 3/ $N \leq 5$	Total number of stations
	2	-	2	3	-	7
[	-	3	-	6	3	12
[I	-	-	2	1	1	4
/	4	3	3	3	-	13
	6	4	-	2	-	12
I	8	1	4	4	-	17
II	10	1	1	-	-	12
[illegible]	1	4	4	1	-	10
X	-	-	1	-	-	1
otals	31	16	17	20	4	88

/ "Usable" data for four of the 88 stations originally catagorized under classes A through D (table 1) based upon visual inspection of data-availability were found upon detailed analysis to not be sufficient; hence, their assigned class status was converted to class "X".

Time Changes

An evaluation for detection of significant time changes was conducted on both stream temperature and streamflow chemical-quality data. In both cases, annual time series for each station were utilized in the evaluation. In the former case, the trend analysis was carried out on annual series of parameter coefficients derived from harmonic analysis of daily records of stream temperature. In the latter case, annual specific conductances were considered as an index of changes in concentrations of the major inorganic solutes.

Several parametric and nonparametric tests of hypotheses for significant changes were available for the assessment. Examples of the application of parametric tests for trends in salinity-streamflow relationships were given by Steele (1970), and Steele and Gilroy (1971). A distinct advantage of nonparametric tests (for significance of changes) is that rigorous assumptions need not be made about the underlying distributions of the data used in the analysis. For purposes of evaluating time trends in this assessment, a nonparametric test, Kendall's tau, was applied to the relevant data. A good reference for practical uses of nonparametric statistical tests is Conover (1971).

Stream Temperature

The time increment for analysis shall be assumed to be a water year. The days of the water year will be denoted by the integers 1 thru 365 or 366, the latter if a leap year is involved. October 1 shall be denoted by the integer 1; September 30 shall be denoted by 365 or 366. Let S(y,j) denote the set of integers corresponding to the days of the yth year for which some stream temperature measurements are available at the jth site. Let $T(y,j,t)$ denote the stream temperature measurement at site j on day t in year y, with $t \in S(y,j)$.

Define the periodic process $\hat{T}(y,j,t)$ by

$$\hat{T}(y,j,t) = M(y,j) + A_1(y,j) \sin (b \otimes t) + A_2(y,j) \cos (b \otimes t) \quad (1)$$

with $b = 360°/(365 \text{ or } 366 \text{ days}) \approx 0.985$ degrees per day.

The increments for days (t) are integers and $M(y,j)$, $A_1(y,j)$, $A_2(y,j)$ are coefficients to be determined by the method of least squares as follows.

Let

$$d(y,j,t) = T(y,j,t) - \hat{T}(y,j,t) \quad (2)$$

for $t \in S(y,j)$ and let

$$d^2(y,j) = \sum_{t \in S(y,j)} d^2(y,j,t). \quad (3)$$

Then $M(y,j)$, $A_1(y,j)$, and $A_2(y,j)$ are obtained as those values which minimize $d^2(y,j)$. Hence, $M(y,j)$, $A_1(y,j)$, and $A_2(y,j)$ are obtained by performing the classical regression of $T(y,j,t)$ on $\sin(b \otimes t)$ and $\cos(b \otimes t)$.

Now let

$$A^2(y,j) = A_1^2(y,j) + A_2^2(y,j) \quad (4)$$

and

$$C(y,j) = \tan^{-1} \frac{A_2(y,j)}{A_1(y,j)} \quad (5)$$

This procedure is similar to that used previously by Ward (1963) and Collings (1969), and the annual harmonic used in the analysis may be considered having the following form:

$$\hat{T}(y,j,t) = M(y,j) + A(y,j) \sin [b \otimes t + C(y,j)] \quad (6)$$

Thus, if at the jth station, there are N_j years of record, the jth station has associated with it the three sequences

$$A(1,j),\ A(2,j),---,\ A(N_j,j) \qquad (7a)$$
$$M(1,j),\ M(2,j),---,\ M(N_j,j) \qquad (7b)$$
$$C(1,j),\ C(2,j),---,\ C(N_j,j) \qquad (7c)$$

A fourth sequence is defined by taking the sum $A(y,j) + M(y,j) = AM(y,j)$ for $y = 1,2,--, N_j$

Each of these four sequences of coefficients at each site is then examined for trend by applying Kendall's tau.

At each of 80 stations distributed throughout the United States having stream temperature records (appendix B-1), the above four sequences of coefficients were determined.

Annual harmonic fits of daily stream temperature records at each of the 80 stations that were used in evaluating long-term changes in the coefficients are tabulated in appendix C. Note in several cases that the number of missing or zero-temperature days (difference between total number of days of year and NDAYS) is quite large. Intervals of at or near 0°C temperatures (observed during winter months at several stations) were treated in the analysis as missing days (hence, were not included in the regression computation) in order not to distort the harmonic fit of stream temperature for non-zero temperature days.

The four harmonic coefficients $\{ A(y,j),\ C(y,j),\ M(y,j),\ AM(y,j) \}$ for $y = 1,--,N_j$, give a gross, overall measure of the annual variability of stream temperatures at each sampling site. The relative magnitudes of these annual harmonic coefficients over the available period of record at each site would therefore give some idea of how the annual stream temperatures at each of the 80 stations having temperature records (appendix B-1), have varied over the period of record. A non-statistical subjective concept of a trend is that any one particular sequence of numbers will be said to have a trend if the numbers toward the end of the sequence tend to be greater than the numbers at the beginning of the sequence (upward trend) or less than the numbers at the beginning of the sequence (downward trend) (Conover, 1971, p. 130). Kendall's tau test for trend formalizes this concept. The absolute magnitude of the difference is not considered at this stage of the analysis.

As a screening technique to determine those stations to be investigated more thoroughly, a nonparametric test for trend, Kendall's tau was used on each of the four sequences of coefficients for each of the 80 stations. The nonparametric nature of this test implies no reliance on a specified mathematical form for the probability distribution function of the coefficients. Kendall's tau statistic is applied by simply ranking the data according to magnitude and assessing whether the data (that is the time series for a given harmonic coefficient) in the early part of the record are larger or smaller than the data in the later part of the record. Thus, the test depends only on the relative magnitudes of the data. The test procedure used was two-tailed so that the null hypothesis was that there was no trend. That is, the sequence of numbers is distributed identically throughout the period of record. The significance level chosen for screening purposes was 0.01. Bounds for the significance level actually attained by the sample statistic are given in table 4 (see p. 44). The coefficients were rounded to tenths (°C for A_j and M_j and radians for C_j) for purposes of the trend analyses.

For any sequence showing a trend over time a split of the record into two parts was made by visual inspection and a 98 percent confidence interval for the difference between the means of the two periods was found by using the Mann-Whitney test statistic.

Chemical Quality of Streamflow

For each of 88 stations the following analysis of the relationship between specific conductance and discharge was carried out. At the i^{th} site specific conductance and discharge were measured concurrently N_j times in the j^{th} year. These concurrent measurements of specific conductance (K) and discharge (Q) at site i in year j are noted by

$$K_i\ (j,\ t),\ Q_i\ (j,\ t)$$

for times in the year $t = 1, 2, \ldots, N_j$ at which samples were collected and analyzed. The annual mean discharge, $Q_i\ (j)$, for the i^{th} site in the j^{th} year is given by

$$Q_i\ (j) = \frac{1}{N_j} \sum_{t=1}^{N_j} Q_i\ (j,\ t). \qquad (8)$$

The discharge-weighted annual mean specific conductance value, $K_i\ (j)$, for the i^{th} site in the j^{th} year is given by

$$K_i\ (j) = \sum_{t=1}^{N_j} W_i\ (j,\ t)\ K_i\ (j,\ t) \qquad (9)$$

where the weight function $W_i\ (j,\ t)$ is given by

$$W_i\ (j,\ t) = Q_i\ (j,\ t)\ [Nj\ Q_i\ (j)]^{-1}. \qquad (10)$$

It should be noted that

$$\sum_{t=1}^{N_j} W_i\ (j,\ t) = 1. \qquad (11)$$

Let N_i denote the number of annual values of discharge-weighted specific conductance values and of stream discharges thus obtained at station i. These N_i values were transformed into log space with

$$X_i\ (j) = \log_{10} Q_i\ (j) \tag{12a}$$

$$Y_i\ (j) = \log_{10} K_i\ (j) \tag{12b}$$

for j = 1, 2, ... N_i.

The set of N_i-ordered pairs X_i (j) and Y_i (j) were then used to determine the ordinary linear least square regression line $\hat{Y}_i$ (j) where

$$\hat{Y}_i\ (j) = \overline{Y}_i + b_i\ [X_i\ (j) - \overline{X}_i] \tag{13}$$

where $\overline{Y}_i$ and $\overline{X}_i$ are the sample mean values of the Y_i (j) and X_i (j), respectively, and b_i is the slope of the regression line. The regression relation given in equation (13) is an indicator of the relation between specific conductance and discharge. The regression relation would help one in determining what proportion of the variation in specific conductance values (Y_j) is explained by variation in annual mean discharges (X_i). Also, a change in the regression relation from one time period to another would be an indication of change in the quality of the stream over and above changes in flow.

To assist in determining whether a change in the regression relationship had taken place the residuals, e_i (j), defined by

$$e_i\ (j) = Y_i\ (j) - \hat{Y}_i\ (j) \tag{14}$$

were analyzed. As in the case of the analysis of the annual harmonic coefficients, Kendall's tau was applied at each site as a screening technique to detect any trends in the regression residuals. A two-tailed test with significance level set at 0.01 was used for this screening purpose. The same nonparametric test was applied to the X_i (j) and Y_i (j) annual series also. Because the Kendall's tau statistic is a function only of the ranks of the data--the relative magnitudes of the numbers in the sequence--and because the logarithmic transformation is monotonically increasing, the test statistic yields the same result whether applied to the actual data or the logarithms thereof (see equations 12a and 12b).

If a trend was found in the regression residuals at a site, visual inspection of the residuals then was used to determine the point in the time series at which a change in the regression relation occurred. Commonly, a clear pattern developed of residuals in the first time period being mostly all positive (negative) while those in the second time period were mostly all negative (positive).

The Kendall's tau test was applied concurrently to the annual series (log-transformed) of stream discharge and specific conductance. It might be expected, in a few cases, that observed significant increases (decreases) in levels of specific conductance might be due to corresponding decreases (increases) in annual streamflows. These effects could be compensatory so that no trend was apparent in the conductance-discharge regression residuals (see equation 14). Time changes in streamflow may or may not be attributed to man-induced causes.

Areal conditions

In order to depict "current" conditions of streamflow quality nationwide, annual harmonic coefficients of stream temperature and selected records of streamflow chemical quality were examined for areal variations. Results of the analysis were grouped into the several areas of one or more WRC regions described above for purposes of distinguishing gross differences in the various quality characteristics of streamflow. In this manner, individual idiosyncrasies of sampling sites are in part masked out in order to give a more general representation of overall quality conditions in the Nation.

Stream temperature

The methodology of harmonic analysis of daily records of stream temperatures described above for time changes was also utilized to depict areal conditions. The annual series of sequences of harmonic coefficients A, C, and M[4/] (harmonic amplitude, phase coefficient, and mean, respectively), were summarized statistically over the period of record for each station in order to depict average characteristics of stream temperature nationwide. Areal conditions of stream temperature were described in terms of these coefficients rather than in terms of the data themselves, in part, because of problems encountered with missing daily values or gaps in the record which occurred for almost all station-years of record. Because few station records were readily available for analysis prior to the 1960 water year (see appendix B-1), the entire period of record available at each sampling site was used to summarize the characteristics of stream temperatures.

4/ Short-hand notation for A(y,j), C(y,j), and M(y,j), respectively (see equation 6).

The effects of trends observed in some of the sequences of harmonic (parameter) coefficients hence will be ignored in this phase of the assessment.

The characteristics of the harmonic parameters are expressed in terms of the mean and standard deviation of the values for the period of record available for each of the 80 NASQAN stations with daily stream-temperature data. These mean annual characteristics are then compared for stations grouped by areal designation (table 1).

Chemical quality of streamflow

The sets of data constituting available laboratory analyses for the 88 NASQAN stations for the 1966-72 water years were used for the assessment of areal conditions in streamflow chemical quality. The number of samples and the number of determinations for the variables of interest were highly variable from station to station during the designated period of record. That is to say, any given variable may not have been analyzed for a number of the total samples for the period. The data set for each station was obtained from the data available in the Water Quality File of the Geological Survey's National Water Data Storage and Retrieval System (see appendix B-2). Several station-years of data are not represented; specifically, the data for 1972 water year were not yet available at the time of the assessment study for several stations in the western United States.

The following variables were selected for summarizing areal conditions: stream discharge (Q), nitrate (NO_3^-), chloride (Cl^-), dissolved solids (DS), total hardness (HRD), and specific conductance (K_{sc}). Because of different methods of determination, dissolved-solids values are stored by two parameter codes in the data system: (1) residue-on-evaporation (DSR) and (2) sum-of-constituents (DSS). Where significant amount of suspended organic material is included in a given sample (such as in south-central and southeastern U.S. streams), these two values for a given sample may be substantially different.

The available data for the selected variables are summarized for each station by listing the minimum observed value, mean value, and maximum observed value. Gross variations in areal conditions are then noted by the designated areal breakdown of the 88 sampling sites into groupings. Implicit in this kind of statistical summary is the assumption that significant changes in streamflow chemical-quality conditions for the period of record (7 years) are minimal.

RESULTS

In discussing the analytical and statistical results of the assessment, stream temperature will be considered separately from streamflow chemical quality. This is felt justified because the sources of data, the periods of available record for each station, and treatment of the data are distinct in the two cases. In summarizing areal variations and characteristics of streamflow chemical quality nationwide, major consideration was given to the "current" period of record, defined for purposes of this assessment to be available chemical analyses for the 1966-72 water years.

Areal variations in streamflow chemical quality

Variations in streamflow chemical quality as given by analysis of the available data are described by the areal designations as given in table 1. In this manner, streamflow chemical-quality characteristics can be conveniently compared for appropriate clusters of stations within each area, in order to more readily generalize the relevant characteristics and to point out anomalous situations for individual sampling sites relative to the cluster of stations.

The variables selected for inclusion in the study for purposes of depicting areal variations in streamflow chemical quality and in overall flow conditions were listed above (p. 30). Data for other variables (predominantly the major inorganic constituents) were also analyzed but will not be summarized in this report for lack of space and time. Besides, several of these variables are highly correlated with either dissolved solids or specific conductance, and the latter variable may aptly serve as an indicator of variations in chemical composition (Steele and Matalas, 1971). Descriptive summaries will be made in terms of mean and extreme data values for the above selected variables.

A summary of selected statistical measures by station for available data during 1966-72 water years is given in appendix D. Station results are clustered by areal designation (given in table 1) to facilitate the discussion below. The summary results in appendix D may be compared with the long-term annual statistics (appendix E) for the entire period of record. Mean values for specific variables in the two tables are frequently quite similar, despite the fact that they have been derived using two distinct types of data (available sets of discrete chemical analyses in appendix D versus annual mean discharge-weighted values in appendix E). Because mean values in appendix D are derived by simple averaging (that is, no weighting for level of streamflow), they may in some instances be substantially higher than corresponding values in appendix E. Except where specifically noted, the following areal descriptions will be based upon the statistical results provided in appendix D for depicting "current" conditions in streamflow chemical quality. Data for nearly 16,000 chemical analyses for the 88 stations are incorporated into the statistical summary tabulated in appendix D.

The geographical distribution of mean specific conductances is given in figure 3. Station coded symbols plotted on the map indicate five discrete ranges in specific conductances. Nationwide, nearly 22 percent of the mean K_{sc} values (for 19 stations) fell below 250 micromhos/cm. Twelve of these stations are located east of the Mississippi River and in Puerto Rico (areas I-III and IX, respectively, see figure 2), and another five are located on the Pacific coast (area VIII). The remaining frequency distributions of mean K_{sc} values are summarized in table 3a. Of the 48 stations exhibiting K_{sc} values greater than 500 micromhos/cm, 40 are located in areas II-VII covering the central areas of the United States not covered above. Four of the five sites with mean K_{sc} values greater than 4,000 micromhos/cm are located in area VI (Texas Gulf and Rio Grande); the fifth is located in Oklahoma in the Arkansas River basin (area V).

Similar distributions are indicated by total hardness and chloride concentrations. Breakdown by ranges of concentrations for these two variables based upon the values given in appendix D are given in tables 3b and 3c.

Table 3--Frequency distribution of mean values of selected variables

a. Specific conductance

Number of Stations	Range of mean values (micromhos/cm)
19	70-250
21	251-500
30	501-1000
13	1001-4000
5	>4000
88 Total Stations	

b. Total hardness

Number of Stations	Range of mean concentrations (mg/l as $CaCO_3$)
25	10-120
42	121-300
15	301-500
6	>500
88 Total Stations	

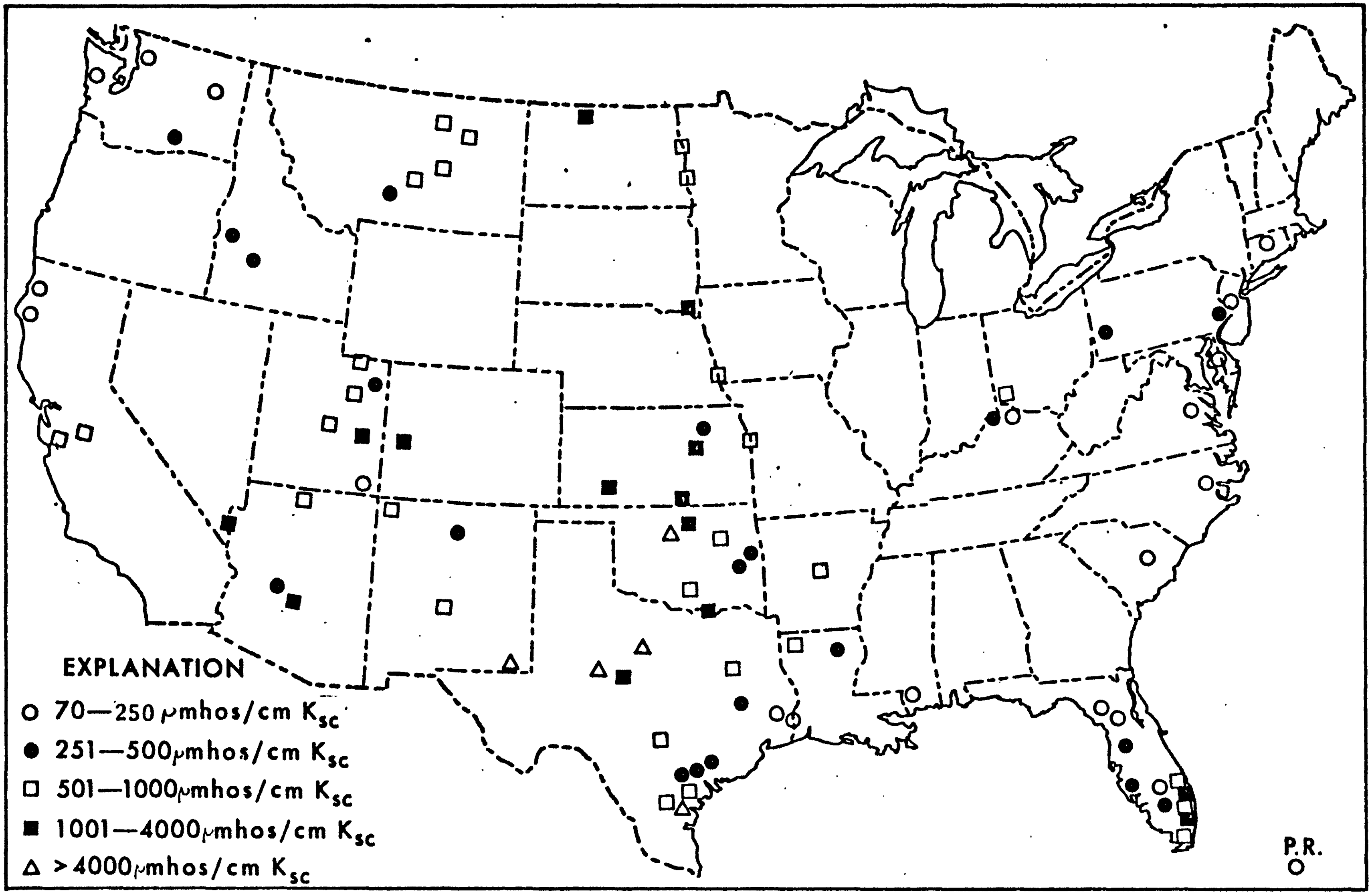

Figure 3.--Areal variation of mean specific conductances as given by available data during 1966-72 water year period of record.

Table 3.--Frequency distribution of mean values of selected variables--continued

c. Chloride

Number of Stations	Range of mean concentrations (mg/l)
72	0-100
7	101-250
3	251-500
6	>500
88 Total Stations	

Streamflow at 21 stations could be considered as excessively hard (that is, with mean HRD concentrations greater than 300 mg/l as $CaCO_3$). Mean Cl concentrations of nearly 82 percent of the sampling sites included in the study were less than 100 mg/l. The extreme ranges of K_{sc}, HRD, and Cl values, indicated in figure 3 or in table 3, involves a total of nine stations, three of which were represented in the case of all three variables. Eight of these nine stations with high levels of either K_{sc}, HRD, or Cl are located in areas V and VI (see table 1 and figure 2).

Atlantic Coast (above Florida)

With the exception of Survey station 01474500, streamflow chemical-quality index characteristics indicate quite dilute conditions, both on an average or an extreme basis. For the other six stations in this area, mean DS concentrations do not exceed 100 mg/l (for either DSR or DSS) and maximum DS concentrations for the 1966-72 water years have never exceeded 140 mg/l (appendix D). Total hardnesses for streamflows at these six sites are low enough to fall into the soft-water category. Chlorides never exceed 30 mg/l and NO_3 concentrations never exceed 12 mg/l, based upon the samples collected.

Data from Survey station 01474500 (sequence code 03) exhibited higher concentrations for all variables described relative to data of the other six stations. Nitrate levels were anomalously high (mean of 12 mg/l as NO_3 with measured maximum of 22 mg/l as NO_3). Although concentrations of the other quality variables were high for this area (based upon records for the seven stations selected for the assessment), they are still below corresponding levels in areas II-VIII (see also appendix E).

Florida and Eastern Gulf

Discharge levels and drainage areas for the 12 stations included in this area are relatively low. Nitrate levels are quite low--means never exceeding 1.5 mg/l and the highest maximum being 8.3 mg/l for any of the selected samples. Concentrations of dissolved constituents for several of the streams are quite high--mean DSS for three of the sites exceeds 500 mg/l with corresponding mean Cl concentrations ranging between 180-200 mg/l. Hardness concentrations are relatively high, with 8 of the 12 stations having average HRD concentration in excess of 100 mg/l (as $CaCO_3$). It should be noted in table 3 that sample sizes for variables for several of the stations are quite low.

The statistics for annual mean values (appendix E) for the set of stations in this designated area (II) indicate that, over the longer term, quality conditions have not been as high as indicated by the data for 1966-72 water years (appendix D). Comparative streamflow conditions in the two appendices (D and E) (mean Q values) at Survey station 02277000 (sequence code 13) and at Survey station 02285000 (sequence code 14) are radically different, indicating the effects of small sample size on stream-discharge statistics at each station.

Ohio River basin

This area (designated as III in table 1) corresponds with WRC region 05 and is contained in the Survey's basin numbering scheme as hydrologic region 03. Unfortunately, records for only four NASQAN stations represent this area, and two of the sites (sequence codes 22 and 23) had no discharge data reported jointly with data on streamflow chemical quality. Hence, any generalization of streamflow quality conditions for this area will be limited. Mean DS concentrations at the four stations range from 152-431 mg/l. Corresponding mean HRD concentrations range from 100-308, with the stream with the highest HRD (station 03276600, sequence code 22) also exhibiting the highest mean DS and K_{sc} values (431 mg/l and 692 micromhos/cm, respectively). Mean and maximum Cl concentrations are low, with observed maximum Cl concentration never exceeding 170 mg/l. Nitrates for two sites (03049655 and 03251500, sequence codes 20 and 21) are consistently below the recommended limits for drinking water standards (FWPCA, 1968, p. 23) of 45 mg/l as NO_3. In contrast, NO_3 at the other two sites (03276600 and 03277200, sequence codes 22 and 23) are relatively high, with mean concentrations of 15 and 7.0 mg/l, respectively, and maximum concentrations of 42 and 22 mg/l, respectively, but still below recommended drinking water standards.

Souris, Red, and Missouri River basins

Streamflow chemical-quality conditions in area IV are areally highly variable. Drainage areas of the selected streamflow sites range from 5,329 to 414,400 mi^2 or 13,800 km^2 to 1,073,300 km^2 (for Survey stations 06308500 and 06807000, sequence codes 30 and 33, respectively, appendix A). This range is reflected in the variability in mean Q reported in appendix D.

Nitrates are generally quite low, with mean concentrations never exceeding 6.0 mg/l. However, in several instances, observed maximum NO_3 concentrations have exceeded 10 mg/l and in two instances have been as much as 26 mg/l.

Mean Cl concentrations range from 5.9 to 67 mg/l for the 13 stations included in the study. Mean DS concentrations range from 230 to nearly 1,100 mg/l; in five instances, mean concentrations exceeded 500 mg/l. Mean HRD concentrations are consistently more than 100 mg/l and reach as much as 537 mg/l as $CaCO_3$ (for Survey station 06478500, sequence code 32).

Arkansas and Red River basins

As for the previous area, streamflow quality conditions for the 12 sites representing these two major basins are highly variable and, in several instances are relatively saline.

The Arkansas River at Dodge City, Kansas; at Arkansas City, Kansas; and near Tulsa, Oklahoma (Survey stations 07139500, 07146500 and 07164400; sequence codes 37, 38, and 40, respectively) exhibited DS concentrations ranging from 974 to 1,850 mg/l. The Cimarron River at Perkins, Oklahoma (Survey station 07161000), exhibited the most saline conditions of the 12 stations in the area. Average and maximum DS concentrations were 5,240 and 15,700 mg/l respectively, with concurrent Cl concentrations of 2,730 and 8,600 mg/l, respectively. Corresponding concentrations from the annual mean series (appendix E) indicate slightly lower estimates of long-term average conditions on an annual basis.

On the other extreme, streamflow chemical-quality conditions at Survey station 07367000 (sequence code 48) (in WRC region 08) are quite dilute except for NO_3, which ranged between 0.2 and 25 mg/l and averaged 5.1 mg/l. For the levels of K_{sc} at that site, HRD concentrations are relatively low, and Cl concentrations are relatively high but still low in absolute terms.

Mean HRD concentrations for the other 11 sampling sites all exceeded 100 mg/l, with concentrations for the four relatively saline stations described above ranging from 258 to 837 mg/l as $CaCO_3$. Mean NO_3 concentrations ranged from 0.3 to 8.7 mg/l, with maximum observed NO_3 concentrations exceeding the drinking water standards in none of the 12 cases.

Texas Gulf and Rio Grande

Records for 17 NASQAN stations were included in this area (VI) for summarizing current conditions of streamflow chemical quality. Hydrologic conditions in this area range from a mean annual rainfall of more than 50 in. (1,270 mm) in Eastern Texas to less than 10 in. (254 mm) in the far western part of Texas (Steele and Jennings, 1972). Corresponding with areas of high rainfall are streams in the area of lowest salinity; namely, the Sabine River and Neches River (Survey stations 08030500 and 08041000, sequence codes 49 and 50) where mean DS concentrations are about 100 mg/l.

At the other extreme, 5 of the 17 sampling sites exhibited mean DS concentrations exceeding 1,000 mg/l, mean K_{sc} values exceeding 1,800 micromhos/cm, and mean Cl concentrations exceeding 997 mg/l. Mean HRD concentrations at these same five sites ranged from 412 to more than 2,000 mg/l as $CaCO_3$. The most saline conditions both in this area and for all 88 stations used in the assessment were noted in the Pecos River (Survey station 08407500, sequence code 65) (appendix D).

The remaining 10 sites had mean DS concentrations ranging between 161 and 513 mg/l, mean HRD concentrations between 87 and 271 mg/l as $CaCO_3$ and mean Cl concentrations ranging between 7.6 and 91 mg/l.

Mean NO_3 concentrations at the 17 streamflow sites ranged from 0.3 mg/l (Survey station 08211000 , sequence code 62) to more than 11 mg/l (Survey station 08065350, sequence code 51). Two stations reported maximum NO_3 concentrations in excess of the drinking water standards of 45 mg/l (as NO_3). In all but one instance, minimum observed NO_3 concentration was zero for streams in this area.

The proportionately low levels of Cl for the levels of K_{sc} at Survey station 08313000 (sequence code 63) should be noted.

Colorado River basin

Streamflow chemical quality at the 12 selected sites in the Colorado River basin are consistently high and have less variability in mean values than data for areas IV-VI previously described. Mean DSR concentrations range from 267 to 883 mg/l, with all but two station's values exceeding 500 mg/l. Chloride concentrations are slightly more variable areally, ranging in mean concentrations from 13 to 214 mg/l. Mean HRD concentrations range from 150 to 476 mg/l as $CaCO_3$, however, excessively high maximum observed HRD concentrations (that is, greater than 500 mg/l) were noted for the following six sampling sites: Survey stations 09152500, 09180500, 09306500, 09315000, 09368000, and 09379500 (sequence codes, 66, 67, 70, 71, 72, and 73, respectively).

Mean NO_3 concentrations ranged from 0.7 to 6.6 mg/l for the 12 stations. However, none of the stations recorded maximum NO_3 concentrations exceeding drinking water standards. The anomalously high annual mean NO_3 concentration for Survey station 09306500 (sequence code 70) (appendix E) was computed for the 1958 water year.

Pacific Coast

With the possible exception of the Salinas River (Survey station 11152500, sequence code 78), streamflow chemical quality for the 10 sampling sites representing WRD regions 17 and 18 were relatively dilute. The above-named site, located below a sugar producing company and having low flows composed mainly of plant effluents, was the single location with mean DS concentration exceeding 500 mg/l or with mean HRD concentration exceeding 200 mg/l. Two streams in the State of Washington, the Chehalis River (Survey station 12031000, sequence code 82) and the Skagit River (Survey station 12200500, sequence code 83) were particularly low in levels of solute concentrations, exhibiting mean DS concentrations less than 60 mg/l and HRD concentrations ranging from 13 to 36 mg/l as $CaCO_3$, which was matched only by a few streams in area I. Mean Cl concentrations ranged from 0.5 to 95 mg/l.

Nitrate concentrations were generally low and below drinking water standards, with the exception of the Salinas River which receives significant effluent discharges. At the site on the Salinas (Survey station 11152500, sequence code 78), mean NO_3 concentration was nearly 21 mg/l with a maximum reported value of 83 mg/l, both of which were the highest of all 88 stations for this variable.

Puerto Rico

Only one station (Survey station 50071000, sequence code 88) represented this area designated as IX and WRC region 21. Being in a high rainfall area, streamflow chemical quality of the Rio Fajaro is very dilute, exhibiting characteristics comparable to several dilute streams in areas I, II, and VIII. Mean DS concentration was 85 mg/l with a corresponding HRD concentration of 35 mg/l as $CaCO_3$ and a Cl concentration of 12 mg/l. Note the small drainage area of this stream at the sampling site (appendix A) and correspondingly low mean value of streamflow.

Areal and temporal variation in stream temperature

The results of the harmonic analysis of available daily records of stream temperature at each site are summarized in table 4. Mean annual values and standard deviations (see notation explanation of table 4, p. 46) for harmonic amplitudes A and means M (as well as A+M) are represented in degrees Celsius and the phase coefficients C are given in radians. The period-of-record mean values at any site may be compared with the variations in corresponding annual time series (appendix C). A total of 780 stations years of daily records of stream temperature are reflected in this assessment, giving an average of 9.8 years for each of the 80 stations where daily temperature measurements are reported.

Areal variations of the phase angle C are minimal, with mean annual values of this parameter for only 5 of the 80 stations lying outside of the range of 2.40 to 3.00 radians. This harmonic coefficient merely reflects the phasing of the harmonic cycle in time and the consistency indicates that seasonal maximum and minimum stream temperatures occur across the country at approximately the same time of year (within ± 35 days), even for regulated streams. Because stream temperatures are so closely correlated with the climatological cycle (specifically, air temperature), one would expect little variation of these harmonic coefficients in depicting temperatures in the Northern hemisphere for

TABLE 4.--STATISTICAL SUMMARY OF HARMONIC COEFFICIENTS FOR AVAILABLE STATION RECORDS OF STREAM TEMPERATURES.

CODE	STATION	NYRS	ABAR	ASD	CBAR	CSD	MBAR	MSD	AMBAR	AMSD	A	C	M	AM
1	01184000	4	1275	44	252	10	1270	50	2545	67	0	0	2-	2-
# 2A	01463500	26	1234	144	269	05	1396	77	2631	190	1+	0	0	3+
# 2B	01463500	26	1186	94	269	05	1327	78	2512	92	4+	0	0	5+
3	01474500	8	1244	75	266	07	1558	88	2802	56	0	0	1+	2+
5	01673000	5	1088	129	276	06	1447	96	2535	155	0	2-	4+	0
6	02083500	5	1040	67	282	03	1508	36	2549	109	4-	0	0	4-
7	02129000	7	1045	173	267	07	1594	198	2639	164	0	0	2+	1+
11	02256500	7	536	100	274	08	2310	35	2846	86	3+	1+	0	3+
12	02273200	6	680	117	283	12	2402	25	3080	119	1+	0	0	1+
13	02277000	7	571	72	270	05	2366	32	2937	52	2+	0	5-	0
14	02285000	7	425	76	261	40	2445	74	2870	119	2+	2-	0	3+
15	02296750	5	610	78	278	15	2399	171	2950	106	0	0	0	0
16	02313000	8	655	114	282	07	2226	130	2881	121	4+	0	5-	0
17	02320500	7	597	53	269	11	2135	71	2732	87	0	0	1+	0
18	02321500	11	712	57	282	09	2039	40	2752	68	0	0	2+	5+
19	02489500	6	957	80	282	12	2077	71	3033	90	0	0	0	0
20	03049655	6	1297	79	259	01	1355	61	2653	123	0	0	4-	2-
21	03251500	12	1198	113	283	05	1313	100	2512	142	0	3-	3+	1+
22	03276600	12	1226	62	273	05	1606	50	2832	101	0	0	0	0
23	03277200	11	1274	78	260	03	1566	50	2840	110	0	0	0	0
24	05054000	12	1228	32	274	02	1080	28	2308	48	0	0	0	0
25	05082500	12	1221	139	272	04	967	127	2190	64	2+	0	3-	0
26	05124000	7	1464	109	277	05	703	94	2167	93	0	0	0	1-
27	06185500	5	1042	61	269	03	752	84	1794	57	0	0	0	0
28	06214500	7	933	91	273	08	880	137	1814	165	0	0	1+	3+
29	06294700	11	1038	176	272	12	916	73	1954	174	5-	2-	1+	5-
30	06308500	11	1248	110	284	05	716	95	1964	121	1+	0	0	5+
31	06329500	11	1309	194	278	06	921	125	2230	147	2-	0	0	5-
32	06478500	10	1400	122	275	07	1144	109	2544	189	3-	1-	0	0
33	06807000	20	1349	74	274	05	1156	68	2506	73	0	0	0	0
34	06877600	11	1176	96	278	08	1364	75	2538	132	0	1+	2+	2+
36	06892500	2	1413	13	283	01	1518	105	2932	119	NA	NA	NA	NA
38	07146500	11	1205	105	285	09	1691	94	2896	152	0	0	0	0
39	07161000	9	1064	117	280	07	1448	100	2512	193	1-	0	3-	2-
40	07164400	11	1160	118	273	09	1635	54	2795	132	0	3-	0	0
41	07178600	9	1198	119	272	11	1722	130	2920	189	0	0	0	0
42	07193500	4	1137	50	258	01	1575	29	2712	56	0	0	2+	2+
43	07245000	9	1007	119	275	10	1519	66	2526	167	3-	3-	1-	1-
44	07263500	24	1208	93	278	06	1799	69	3007	111	0	0	1-	0
45	07331000	11	1058	105	280	04	2011	88	3070	122	1-	0	0	1-
46	07331600	10	944	102	243	12	1699	76	2645	166	2+	0	0	3+
47	07344400	8	1140	86	280	10	1878	80	3018	151	0	1+	0	0
@ 48A	07367000	4	1152	138	270	12	2120	82	3275	80	0	0	2-	0
@ 48B	07367000	5	1164	113	270	10	2042	127	3204	161	0	0	4+	4+

TABLE 4.--STATISTICAL SUMMARY OF HARMONIC COEFFICIENTS FOR AVAILABLE STATION RECORDS OF STREAM TEMPERATURES.--CONTINUED.

CODE	STATION	NYRS	ABAR	ASD	CBAR	CSD	MBAR	MSD	AMBAR	AMSD	A	C	M	AM
49	08030500	12	914	82	273	06	2104	103	3021	159	0	0	0	0
50	08041000	11	989	131	278	07	2042	53	3030	146	2-	0	0	2-
51	08065350	8	994	65	272	09	2039	100	3032	149	0	1+	0	0
52	08068000	10	861	107	286	09	2242	59	3085	125	0	0	2+	0
53	08082500	12	977	162	295	32	1980	128	2956	183	5-	1+	2+	0
54	08123800	12	1006	67	288	06	1818	89	2826	131	2-	1-	5-	5-
55	08126500	10	1051	64	287	05	1935	43	2983	94	0	0	0	0
56	08158000	12	575	91	238	13	2003	112	2578	115	1-	0	0	0
57	08162000	11	890	78	278	09	2083	54	2973	101	0	0	0	1-
58	08164500	12	814	64	280	08	2086	122	2898	141	1-	1-	5-	5-
59	08176500	11	854	80	281	07	2101	48	2957	72	0	0	3+	0
60	08188500	12	834	61	287	08	2148	50	2982	40	1-	0	0	0
61	08189500	9	787	88	280	26	2397	107	3183	145	5-	0	1-	3-
62	08211000	11	852	106	273	09	2171	276	3023	267	0	0	0	1-
63	08313000	8	1051	57	281	04	1431	64	2482	106	1-	1+	0	0
64	08358300	11	976	114	286	07	1444	106	2422	183	0	0	3-	2-
65	08407500	11	1089	46	290	04	1996	54	3085	53	0	0	0	0
66	09152500	12	965	114	274	06	1054	123	2019	215	5-	0	0	1-
67	09180500	14	1041	99	277	06	1159	90	2299	62	0	0	0	0
68	09234500	6	549	398	194	68	732	129	1281	514	2-	4-	4-	2-
69	09251000	11	1043	107	260	13	982	76	2025	164	0	0	0	0
70	09306500	13	1083	139	279	09	909	105	1993	218	0	0	3-	3-
71	09315000	14	1159	75	278	07	1196	109	2356	120	0	3+	0	0
72	09368000	12	1028	129	282	10	1342	90	2369	193	2-	0	0	3-
73	09379500	7	1117	71	285	04	1345	90	2462	144	1+	0	2+	1+
74	09380000	11	789	307	234	43	1340	122	2129	380	5-	2-	2-	5-
76	09502000	11	414	46	197	22	1618	75	2031	74	0	1+	2-	0
77	09510000	9	758	190	213	16	1674	86	2433	268	2-	3-	0	3-
78	11152500	3	576	85	286	20	1755	38	2330	108	NA	NA	NA	NA
79	11303500	4	673	38	278	19	1597	32	2270	57	0	2-	0	0
80	11477000	9	670	75	266	11	1477	66	2148	96	0	0	0	0
81	11530500	6	715	153	257	20	1360	67	2075	210	1-	1+	0	0
82	12031000	11	728	49	274	06	1196	45	1924	61	1+	0	3-	0
83	12200500	8	486	43	254	07	888	50	1374	67	0	1+	0	0
84	12433000	7	827	72	249	09	1127	71	1954	84	0	0	0	0
85	12510500	13	935	74	280	05	1215	59	2150	108	2-	0	2-	3-
86	13154500	13	597	85	279	06	1336	71	1933	44	3+	0	5-	0
87	13212500	13	882	88	274	12	1332	142	2213	207	3-	5-	5-	5-

Table 4.--Statistical Summary of harmonic coefficients for available station records of stream temperatures--continued

Notation:

Summaries 2A and 2B use daily maximum and minimum temperature records for respectively, the following water years: 1954, 1956-61, 1963, and 1965 (see appendix C).

@ Summary 48A uses daily maximum temperature records; whereas, 48B uses daily mean temperature records (see appendix C).

NYRS	= number of years of daily record at a given station
ABAR	= mean of annual harmonic amplitudes A
ASD	= standard deviation of annual harmonic amplitudes A
CBAR	= mean of annual harmonic phase coefficients C
CSD	= standard deviation of annual harmonic phase coefficients C
MBAR	= mean of annual harmonic mean temperatures M
MSD	= standard deviation of annual harmonic mean temperatures M
AMBAR	= mean of annual series of A+M = AM
AMSD	= standard deviation of annual series of A+M
A,C,M,AM	= ranked levels of confidence for significance of trends in time series for A, C, M, and A+M, respectively.

These are coded and ranked as follows:

NA: Not applicable; Kendall test statistic table did not give values for sample sizes $n < 4$ (Conover, 1971, table 11, p. 391).

0: Trend with a significance level greater than 0.20
1: Trend with a significance level equal to or less than 0.20 but greater than 0.10
2: Trend with a significance level equal to or less than 0.10 but greater than 0.05
3: Trend with a significance level equal to or less than 0.05 but greater than 0.02
4: Trend with a significance level equal to or less than 0.02 but greater than 0.01
5: Trend with a significance level equal to or less than 0.01

Significance levels expressed above correspond to a two-tailed test applying Kendall's Tau statistic. Decreasing changes are indicated by (-) and increasing changes are indicated (+).

For a summary of stations showing trends in one or more harmonic coefficients, see table 5 (p.59).

streams which are not appreciably affected by erratic thermal pollution of deep-releases from reservoirs. At the significance level of 0.01 and assuming the accuracy of the C to be $\pm$ 0.1 radian, a trend was detected in the phase angle (C) for only one of the 80 stations included in the assessment (see table 5, page 59). Hence, discussion of areal and temporal variation in stream temperature will be centered around the other harmonic-coefficient descriptions--A, M, and A+M (the latter being an estimate of the maximum annual stream temperature).

Geographical distributions of annual mean (average of M annual series) and extreme average of A+M annual series stream temperatures are given in figures 4 and 5, respectively. Station coded symbols are plotted on the maps to indicate discrete ranges in these two temperature characteristics. The areal variation of mean stream temperature (fig. 4) closely follows that reported by Blakey (1966) using records during 1960-62 for about 300 stream-temperature sites across the Nation. Higher mean temperatures of streams occurred predominantly in Florida and eastern Texas. Lower mean temperatures were exhibited primarily by streams draining the Rocky Mountains in the upper Colorado River and upper Missouri River basins (station codes 27-33 and 66-71); the remaining low temperature streams are situated in the far northern United States.

In general, harmonic amplitudes (as a measure of range of annual variability of stream temperatures) tended to be higher (10-13 C°) in the northern states and declined appreciably (4-8 C°) in the southeastern and Pacific coast areas. However, substantial reductions in annual stream-temperature variations were detected at specific sites within available lengths of record. For the most part, these changes could be attributed to increased regulation in the stream systems (see section on time-trends).

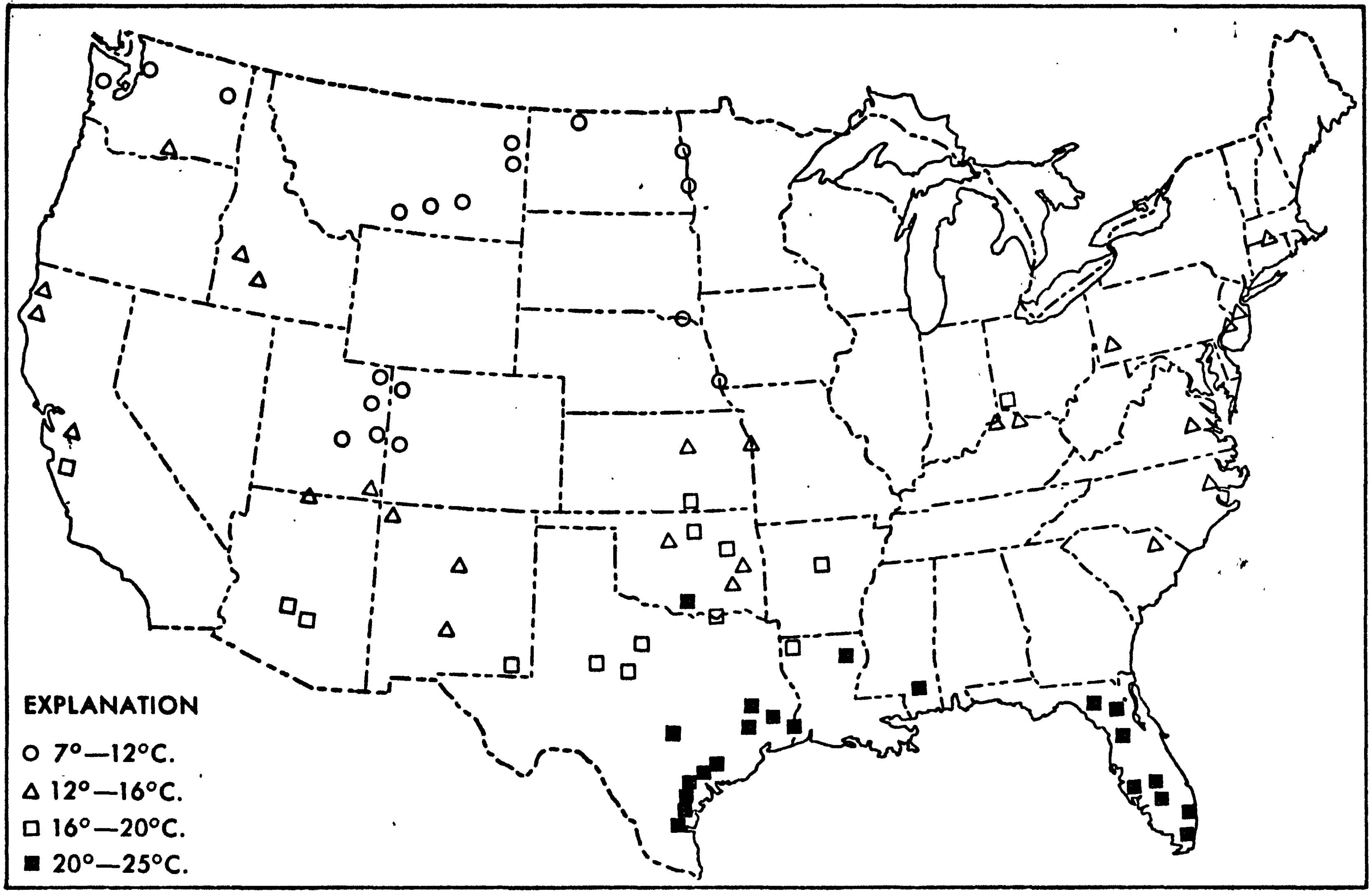

Figure 4.--Areal variation of annual mean stream temperatures.

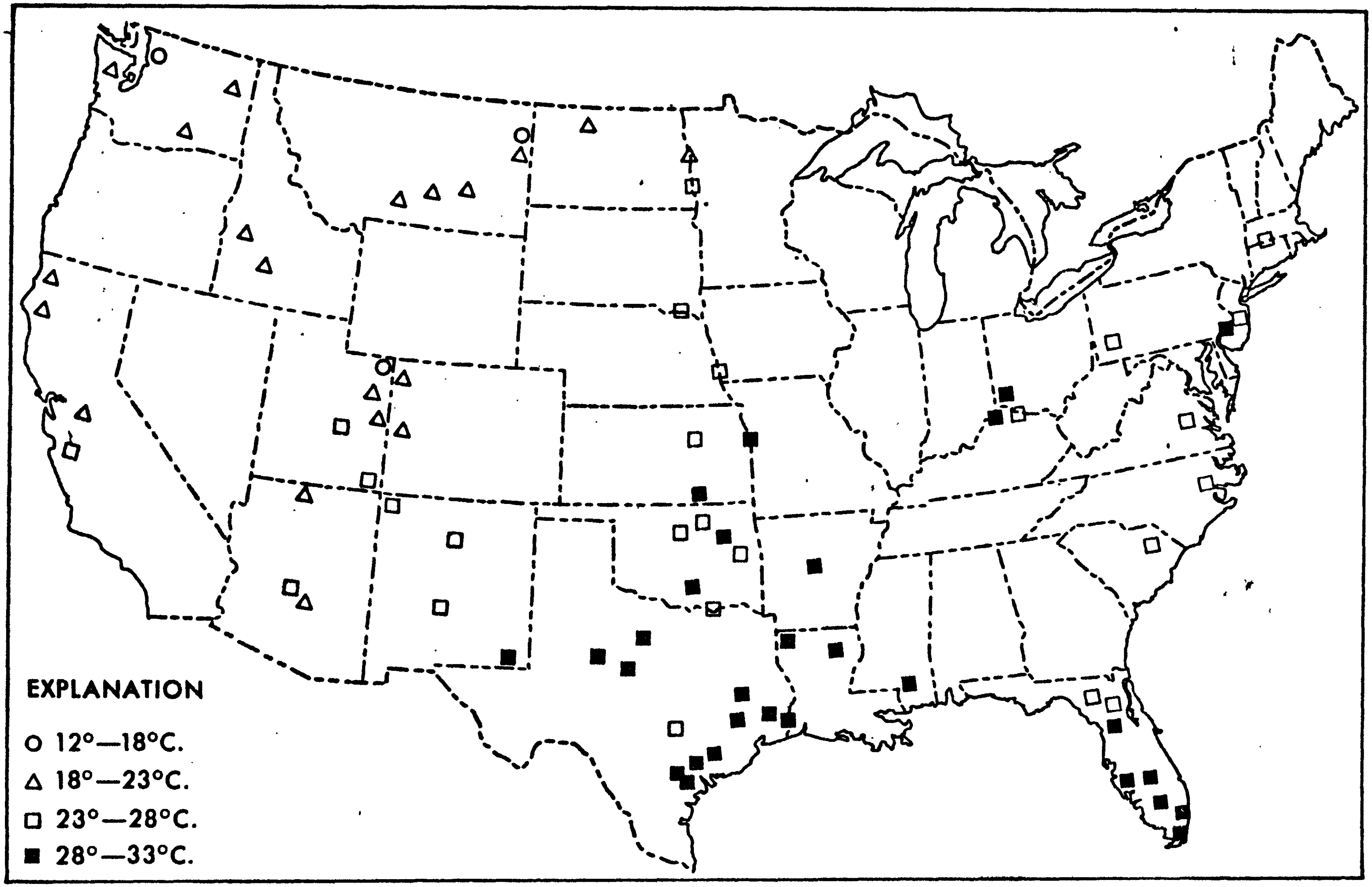

Figure 5.--Areal variation of estimated annual extreme stream temperatures (Mean + Amplitude).

Areal stream temperature characteristics will be described for each of the designated areas. Note in the discussion and in table 4 that daily temperature data were not available for 8 of the 88 sampling sites, including the site in Puerto Rico representing area IX (table 1). Similarities as well as anomalies in harmonic coefficients for each station grouping will be noted. Significant time-trends in stream-temperature characteristics are discussed following the various areal descriptions.

Atlantic Coast (above Florida)

Mean annual amplitudes for the temperature records at six sites in this area range from 10.4 to nearly 12.8°C. Ranges of harmonic mean and estimated extreme stream temperatures were 12.7 to 15.9 and 25.1 to 28.0°C, respectively. The highest standard deviations in the A and M series was observed for Survey station 02129000 (sequence code 7). Note the relatively long period of record for Survey station 01463500 (sequence code 2) relative to the other five sites. The paired statistical summary for this station (A and B in table 4) reflects the effect of using reported daily maximum temperatures for some years (1954, 1956-61, 1963, and 1965) in A as opposed to daily minimum temperatures in B, respectively, for years in which daily mean temperatures were not reported.

Florida and Eastern Gulf

Overall mean annual amplitudes exhibited at the nine sites in this area in the southeastern United States are lower (by 30-50 percent) than in area I discussed above; whereas, corresponding harmonic means are 30-45 percent higher. Annual variability at the eight Florida stations (excluding results for station with code 19 in table 4) ranges from 4.2 to 7.1°C in harmonic amplitudes and from 20.4 to 24.5°C in harmonic means. Estimated maximum temperatures in the area (as shown by A+M) are not in the range of 27.3-30.8°C, being about 3°C higher than for selected sites in area I. The percentage of variance in daily stream temperature data explained by a simple harmonic is generally slightly lower for stations in area II relative to stations in area I (appendix C). This condition is a result of the relatively low seasonal as opposed to year-to-year variability of stream temperatures in the Florida and eastern Gulf area. Observed amplitudes for stream temperature records in this area are lowest of all areas with the exception of area VIII (table 4).

Ohio River basin

Harmonic coefficients for the four stations representing area III are comparable to those for area I described above. However, harmonic means for the downstream two stations (03276600 and 03277200, sequence codes 22 and 23, respectively) are slightly (about 3C°) greater than for the upstream two sites (see figure 1). Percentage of variance explained by the first harmonic is quite high (86-98 percent) for all four stations included in this area (appendix C).

Souris, Red River of the North and Missouri River basins

Stream temperature characteristics in this area (IV) are more variable then for some of the other designated areas, due in part to the immense geographical area covered by the 12 sampling sites (no data were available for Survey station 06887000, sequence code 35).

As shown in table 6, the eight stations on streams in the Souris, Red, and upper Missouri River basins (sequence codes 24-31) exhibit estimated mean and extreme temperatures slightly (3-6 C°) lower than those characterizing the four sites farther south in the lower Missouri (sequence codes 32-34, 36). The lowest mean stream temperatures observed in this area were at Survey stations 05124000, 06185500, and 06308500 (sequence codes 26, 27, and 30, respectively); whereas, the warmest conditions of streamflow (both mean and extreme) for this area were observed at Survey station 06892500 (sequence code 36). The pattern of variations in thermal characteristics corresponds closely with geographical location (see figure 1). With few exceptions, percent variances of stream temperatures explained by a simple harmonic for stations in this area were generally high and ranged from 80-97 percent (appendix C). Stations with sequence codes 26, 28, 29, and 30 exhibited relatively low explained variances compared with the other stations in this area. Observed harmonic amplitudes for several station records in this area (particularly sequence codes 26 and 31-36) are generally higher than for any other designated area (see table 4), indicating the largest ranges of seasonal temperatures.

Arkansas and Red River basins

For the 11 stations representing area V, estimated maximum stream temperatures (A+M) are equal to or greater than that observed for streams in area II to the East; however, harmonic means in area V were up to nearly 10°C less than those calculated for area II. Naturally, this contrast was due to significantly higher amplitudes in area V relative to area II. Observed variations in harmonic coefficients for station records in area V were much less than for area IV to the north. Harmonic amplitudes for sampling sites on streams in the Arkansas and Red River basins ranged from 9.5 to 12.1 °C, and harmonic means ranged from 14.5 to 21.2 °C. Phase coefficients were very consistent throughout the area, ranging from

2.5 to 2.8 radians. Percentage of variance of stream temperatures explained by a simple harmonic function generally is in the range of 85-99 percent; however, a few years for stations with sequence codes 38, 39, 45, and 48 do not fall into this range.

Texas Gulf and Rio Grande

Daily temperature records are available for all 17 NASQAN stations included in the assessment for this designated area. With the exception of Survey station 0815800 (sequence code 56, table 4), harmonic amplitudes ranged from 7.9 to 10.9 C°. The exception noted is a sampling site on the Colorado River below Lake Austin, Texas, where reservoir releases significantly reduce the natural seasonal variability of stream temperatures as indicated by a mean harmonic amplitude of 5.8 C°.

With the exception of two sampling sites on the Rio Grande in New Mexico (sequence codes 63 and 64, table 4), harmonic mean temperatures ranged from 18.1 to 24.5 °C, with the majority being in the interval of 20-22 °C. The lower mean temperatures indicated for the two New Mexico sites probably reflect the combined influence of relatively higher elevations, latitude, and substantial contribution of snowmelt runoff. Estimated maximum temperatures (as given in table 4 by A+M) for the 14 stations excluding the three stations sited above are in the range of 28.0 to 32.4 °C; the three exceptions are lower, in the range of 24.1 to 25.8 °C, for the reasons given above.

Percentages of variance of stream temperature in this area explained by the harmonic are comparable to those of other areas cited above; explained variances for a few isolated years are quite low (see, for example, 1968 and 1971 water year results for Survey station 08082500 (sequence code 53) in appendix C).

Colorado River basin

Daily records of stream temperature were not available for Survey station 09421500 Colorado River below Hoover Dam on the Nevada-Arizona state line. Harmonic amplitudes for the remaining 11 NASQAN stations with stream temperature records in this area appeared to be clustered into two subgroups: (1) stations having sequence codes 66-67 and 69-73 exhibited mean amplitudes ranging from 9.6 to 11.5 C°, and (2) stations having sequence codes 68, 74, and 76-77 had mean amplitudes ranging from 4.2 to 7.9 C°. In the latter four instances, the sampling sites are located below dams impounding reservoirs, and reservoir operating rules have tended to dampen out the normally higher seasonal cycle of stream temperature (see Collings, 1973, figure 9).

With the possible exception of conditions at Survey station 09234500 (sequence code 68), which is located below Flaming Gorge Reservoir, apparent effects of impoundments have had minimal effects on observed harmonic mean temperature. As might be expected, mean temperatures for the sites selected in this area gradually increase from north to south (figure 1), reflecting probable combined effects of elevation and latitude. Estimated maximum temperatures (A+M) have ranged from 12.8 to 24.3 °C with the values at only one of the 11 sites being below 19.9 °C. As shown by results from other designated areas, percentages of variance explained by the annual harmonic fits of daily stream temperatures for all sampling sites in area VII are quite high (with few exceptions, ranging from 80 to 98 percent).

Pacific Coast

Data from a total of 10 sampling sites represent temperature characteristics of streamflow in area VIII. Observed harmonic amplitudes are small relative to other designated areas, being comparable to those observed for streams in area II. With the exception of Survey station 12200500 (sequence code 83), estimated maximum temperatures (A+M) in the area range from 19.2 to 23.3 °C. The relatively low values for all mean harmonic coefficients (A, C, and M as well as A+M) at this station probably reflect the location of the sampling site, being at a northern latitude combined with relatively high elevations where effects of snowmelt runoff are appreciable. Elsewhere along the Pacific Coast, annual harmonic mean temperatures range from 11.3 °C in Washington State to 17.6 °C along the central coast of California.

Percentage of variance in stream temperatures explained by the simple harmonic function generally ranges from 85 to 98 percent, with the few exceptions noted for Survey station 11152500, 11530500, and 13212500 (sequence codes 78, 81, and 87, respectively; table 4).

Based upon this preliminary analysis, 15 of the 80 stations had time-sequences of various stream-temperature characteristics with significant time trends, based upon a significance level of 0.01. The phase-angle sequences (C) indicated a significant trend at only one of the 80 stations having temperature records and this shift in the harmonic phase-angle coefficient corresponds in an observed time shift in the annual cycle of nearly 6 days. The stations displaying trends and the corresponding coefficient differences are shown in table 5. For each of these 21 sequences (4 stations had two sequences and 1 had three sequences with a significant trend), a split of the record into two periods was made by visual inspection. A 98 percent confidence interval was found for the significance of difference between the means of the two periods. The confidence interval was based on the Mann-Whitney test statistic, another non-parametric procedure (Conover, 1971). Eleven of the 15 stations were found to have differences in means not equal to zero at this confidence level. Some of the inferences that may be drawn from the results of this analysis are given in the discussion section.

It must be remembered that when statistical tests are applied to large number of sets of data as has been done in this paper a certain number of rejections of the null hypothesis are to be expected simply by chance even if the null hypothesis were to hold in all cases. That is, if at the 99 percent confidence level a test is applied to 100 stations, one could expect one rejection of the specified null hypothesis just by chance.

Table 5.--Stream temperature stations showing significant changes in one or more harmonic coefficient. 1/

Sequence Code	USGS station number	NYRS	Type of coefficient	First Period Number	First Period Mean	Second Period Number	Second Period Mean	Estimate of change Absolute	Estimate of change Percent	98 percent confidence interval
2	01463500	26	A+M	13	24.7	13	25.6	0.9	3.6	0.3,1.9
13	02277000	7	M	4	23.8	3	23.4	-0.4	-1.7	n.a.
16	02313000	8	M	4	23.1	4	21.4	-1.7	-7.4	-3.5,0.1 2/
18	02321500	11	A+M	5	26.9	6	27.9	1.0	3.7	0.3,2.1
29a	06294700	11	A	7	11.6	4	8.2	-3.4	-29.3	-4.5,-2.5
29b	06294700	11	A+M	7	20.6	4	17.6	-3.0	-14.6	-4.3,-0.5
30	06308500	11	A+M	5	19.0	6	20.2	1.2	6.3	-0.8,3.4
31	06329500	11	A+M	6	23.3	5	21.2	-2.1	-9.0	-4.0,-0.2
53	08082500	12	A	6	10.9	6	8.6	-2.2	-20.2	-4.1,-0.3
54a	08123800	12	M	6	18.8	6	17.6	-1.2	-6.4	-2.6,-0.1
54b	08123800	12	A+M	6	29.2	6	27.3	-1.9	-6.5	-3.6,-0.6
58a	08164500	12	M	6	21.6	6	20.1	-1.5	-6.9	-3.6,-0.2
58b	08164500	12	A+M	6	29.9	6	27.9	-2.0	-6.7	-3.9,-0.7
61	08189500	9	A	4	8.7	5	7.2	-1.5	-17.2	-2.5,-0.6
66	09152500	12	A	6	10.4	6	8.9	-1.5	-14.4	-2.8,-0.1
74a	09380000	11	A	4	11.6	7	5.8	-5.8	-50.0	-7.2,-3.7
74b	09380000	11	A+M	4	25.9	7	18.7	-7.2	-27.9	-9.9,-5.3
86	13154500	13	M	6	13.8	7	12.9	-0.9	-6.5	-1.9,-0.1
87a	13212500	13	M	6	14.5	7	12.3	-2.2	-15.2	-3.6,0.6
87b	13212500	13	A+M	6	23.7	7	20.8	-2.9	-12.2	-5.1,0.3
87c	13212500	13	C	6	2.8	7	2.7	-0.1	-3.6	-0.3,0.0

1/ Level of significance is taken as 0.01.
n.a. = not significant at this level.
2/ 95 percent confidence interval; not significant at 98 percent confidence interval.

Note: Means and absolute changes are in units of degrees Celsius for A, M, and A+M, and in units of radians for C.

Long-Term Changes in Streamflow Chemical Quality

The Kendall's tau test was applied to the following time series: (1) logarithmic-transformed annual stream discharges (equation 12a, p. 26), (2) logarithmic-transformed annual specific conductances (equation 12b, p. 26), and (3) regression residuals (equation 14, p. 26). The latter series in effect masks out the effect of annual variations in stream discharge on specific conductance. Table 6 gives the various levels of significance for any observed time change in the time series indicated in the column heading. Choosing 0.01 as the applicable level of significance for a change, 7 of the 15 instances of trends in residuals could be associated with corresponding changes in the specific conductance time series; another two would have been applicable if the level of significant changes in specific conductances (LOGK) (indicated in table 6 by 5+ or 5-) were in effect cancelled out by significant changes of stream discharge (LOGQ) in the opposite direction with no net shift of significance in the regression relationship. In other words, observed increases or decreases in specific conductance could be attributed solely to shifts in stream discharges in the opposite direction. In only one instance (station number 07331600, sequence code 46, table 8) was a significant increase in specific conductances associated with neither a significant shift in regression relationships nor a significant change in stream discharges in the opposite direction.

Mean values of the annual discharge-weighted specific conductance, $K_i(j)$, and mean annual discharge $Q_i(j)$, were computed for each time period. Assuming a level of significance at 0.01, table 7 shows the 15 stations for which significant shifts in the regression residuals were found as given in table 6. Of these 15 stations, 10 showed an

TABLE 6.--LEVELS OF SIGNIFICANCE FOR EVALUATION OF LONG-TERM CHANGES IN STREAMFLOW CHEMICAL QUALITY.

CD	STATION	YRS	LOGQ	LOGK	RES
01	01184000	9	2-	2+	1-
02	01463500	21	5-	5+	3-
03	01474500	27	2-	5+	5-
04	01491000	8	1-	0	0
05	01673000	8	0	0	0
06	02083500	10	3-	0	0
07	02129000	10	0	0	2-
08	02252500	13	0	0	2-
09	02253000	15	3+	0	3-
10	02253500	15	0	0	0
11	02256500	7	0	2+	3-
12	02273200	X			
13	02277000	X			
14	02285000	X			
15	02296750	7	0	0	0
16	02313000	9	0	0	2+
17	02320500	9	3+	3-	0
18	02321500	6	0	0	0
19	02489500	8	0	1+	2-
20	03049655	X			
21	03251500	11	0	0	0
22	03276600	-			
23	03277200	-			
24	05054000	17	0	0	0
25	05082500	16	0	3-	0
26	05124000	15	0	0	0
27	06185500	7	0	0	0
28	06214500	17	0	0	0
29	06294700	22	1+	0	0
30	06308500	22	3+	2+	5-
31	06329500	22	1+	0	4-
32	06478500	7	0	2+	2-
33	06807000	21	2+	3+	5-
34	06877600	12	0	0	0
35	06887000	13	0	0	1-
36	06892500	10	0	0	0
37	07139500	7	1+	0	0
38	07146500	20	0	1-	0
39	07161000	17	0	0	0
40	07164400	23	0	4-	5+
41	07178600	23	0	0	0
42	07193500	19	1+	0	0
43	07245000	21	1-	5-	5+
44	07263500	26	0	4-	5+
45	07331000	22	1-	1+	0
46	07331600	27	3-	5+	3-
47	07344400	15	3-	1-	2+
48	07367000	6	1+	0	0

TABLE 6.--LEVELS OF SIGNIFICANCE FOR EVALUATION OF LONG-TERM CHANGES IN STREAMFLOW CHEMICAL QUALITY.--CONTINUED

CD	STATION	YRS	LOGQ	LOGK	RES
49	08030500	24	3-	0	2+
50	08041000	24	0	0	0
51	08065350	9	0	0	1+
52	08068000	10	0	0	1+
53	08082500	12	0	0	0
54	08123800	12	0	5+	5-
55	08126500	9	1-	1+	0
56	08158000	24	0	1+	5-
57	08162000	27	0	0	1-
58	08164500	12	0	0	0
59	08176500	24	0	5-	5+
60	08188500	13	0	0	0
61	08189500	9	2+	4-	1+
62	08211000	24	0	0	4-
63	08313000	26	0	0	2-
64	08358300	19	5+	5-	0
65	08407500	34	5-	5+	0
66	09152500	35	1-	0	5+
67	09180500	26	1-	0	0
68	09234500	15	1+	5+	5-
69	09251000	22	0	5+	5-
70	09306500	21	0	0	2+
71	09315000	25	0	3+	2-
72	09368000	18	3-	3+	0
73	09379500	35	1-	2+	0
74	09380000	27	3-	2+	0
75	09412500	22	0	0	0
76	09502000	21	4+	0	0
77	09510000	21	0	0	0
78	11152500	15	0	0	0
79	11303500	15	0	1+	5-
80	11477000	20	0	1+	0
81	11530500	20	2-	5+	5-
82	12031000	10	0	0	2-
83	12200500	11	0	0	1+
84	12433000	12	0	0	0
85	12510500	19	0	0	0
86	13154500	20	0	0	0
87	13212500	21	0	0	5-
88	50071000	11	0	0	0

Table 6.--Long-term changes in streamflow chemical quality--continued

Notation:

CD = sequence code number for station.

YRS = number of years of available record with paired values of stream discharge and specific conductance.

LOGQ = levels of significance for trend in stream-discharge time series (log-transformed).

LOGK = levels of significance for trend in specific conductance time series (log-transformed).

RES = levels of significance for trend in time series for residuals off conductance-discharge regression relationship (log-log).

See appendix E for actual time-series data used in the analysis of significant time changes for log Q, log K_{SC}, and regression residuals, respectively.

Notation for levels of significance and direction for changes corresponds with that given for table 4. (- indicates decrease in levels and + indicates increase in levels of each measure).

NYRS = "X" indicates that fewer than six years of paired annual values were available for the analysis (see table 2).

NYRS = "-" indicates that no discharge data were available for these stations (see appendix B-2).

Table 7.--Streamflow chemical-quality stations showing significant changes of specific conductance - stream discharge regression function (1)

uence Code	Survey station number	NYRS	Variable (2)	Period 1 No.	Period 1 Mean	Period 2 No.	Period 2 Mean	Estimate of change Absolute	Estimate of change Percent
03	01474500	27	Q	17	2,639	10	2,166	-473	-18
			K_{sc}	17	283	10	358	+75	+27
30	06308500	22	Q	8	343	14	470	+127	+37
			K_{sc}	8	636	14	744	+108	+16
33	06807000	21	Q	12	34,960	9	36,960	+2,030	+6
			K_{sc}	12	652	9	723	+71	+11
40	07164400	23	Q	15	7,368	8	5,171	-2,197	-30
			K_{sc}	15	2,250	8	1,970	-580	-23
43	07245000	21	Q	9	5,307	12	4,647	-660	-12
			K_{sc}	9	1,870	12	684	-1,186	-63
44	07263500	26	Q	11	37,870	15	38,190	+320	+1
			K_{sc}	11	759	15	599	-200	-26
54	08123800	12	Q	7	33.0	5	31.5	-1.5	-5
			K_{sc}	7	1,140	5	2,800	+1,660	+146
56	08158000	24	Q	12	1,751	12	1,815	+64	+4
			K_{sc}	12	440	12	510	+70	+16
59	08176500	24	Q	9	842	15	1,785	+943	+112
			K_{sc}	9	619	15	458	-161	-26
66	09152500	35	Q	12	2,790	23	2,528	-262	-9
			K_{sc}	12	869	23	938	+69	+8
68	09234500	15	Q	6	1,989	9	2,018	+29	+1
			K_{sc}	6	595	9	788	+193	+32
69	09251000	22	Q	11	1,418	11	1,502	+84	+6
			K_{sc}	11	239	11	274	+35	+15
79	11303500	15	Q	5	3,913	10	3,548	-365	-9
			K_{sc}	5	368	10	518	+150	+41
81	11530500	20	Q	13	20,280	7	16,730	-3,550	-18
			K_{sc}	13	125	7	145	+20	+16
87	13212500	21	Q	6	2,115	15	1,326	-789	-37
			K_{sc}	6	321	15	408	+87	+27

tes: (1) Level of significance is taken as 0.01.
Trend analysis was carried out on log-transformed data.

(2) Q = stream discharge, in cubic feet per second (ft^3/s).
K_{sc} = specific conductance, in micromhos per centimetre at 25 degrees C.

(3) To measure true change, must use long-term Q in conjunction with split-sample regressions (log K_{sc} - log Q)--see table 9.

increase in discharge-weighted specific conductance over and above that which could be attributed to changes in flow for the two time periods. Five stations showed a decrease in specific conductance over and above that attributable to differences in flow for the two time periods. Table 8 shows four stations for which significant changes in both annual mean series of flow[4/] and specific conductance were found but no significant change in the regression relation was indicated by the analysis of the residuals (table 8). The changes at these four stations can be considered to be of a compensating nature.

In table 11 the changes in levels of specific conductance shown in table 9 are adjusted for differences in levels of stream discharge for the two time periods and are given for the 15 stations displaying a significant change in the regression relation. For each station, a regression relation (equation 13, p. 26) was determined for each time period. The overall logarithmic mean of stream discharge, $\overline{X}_i$, for the entire period was then used as the independent variable in the two separate regressions to determine logarithmic means of specific conductance, $\hat{Y}_{i1}$ and $\hat{Y}_{i2}$ for the two time periods (using equation 13). $\hat{K}_{i1}$ and $\hat{K}_{i2}$ for the two time periods at station i were found by letting

$$\hat{K}_{i1} = 10^{\hat{Y}_{i1}} \qquad (15a)$$

and

$$\hat{K}_{i2} = 10^{\hat{Y}_{i2}} \qquad (15b)$$

Both absolute and relative changes in specific conductances between the two periods are given in the last two columns of table 9.

4/ The one exception being the level of significance for stream discharge being 0.05 instead of 0.01 for station number 07331600 (sequence code 46, table 6).

Table 8.--Streamflow chemical-quality stations showing compensating significant changes in annual series of stream discharge, and specific conductance. (1)

Sequence code	Survey station number	NYRS	Variable (2)	Period 1 No.	Period 1 Mean	Period 2 No.	Period 2 Mean	Estimate of change Absolute	Estimate of change Percent
02a	01463500	21	Q	11	13,130	10	10,580	-2,550	-19
			K_{sc}	11	116	10	130	+14	+12
02b			Q	12	13,316	9	10,046	-3,270	-25
			K_{sc}	12	116	9	132	+16	+13
46	07331600	27	Q	14	5,175	13	3,214	-1,961	-38
			K_{sc}	14	1,400	13	1,770	+370	+25
64a	08358300	19	Q	8	293	11	695	+402	+137
			K_{sc}	8	984	11	687	-297	-30
64b			Q	11	355	8	761	+406	+114
			K_{sc}	11	906	8	682	-224	-25
65a	08407500	34	Q	14	339	20	90	-249	-74
			K_{sc}	14	6,070	20	11,210	+5,140	+85
65b			Q	18	288	16	84	-204	-71
			K_{sc}	18	6,680	16	11,810	+5,130	+77

Notes: (1) Level of significance is taken as 0.01.
No significant trend in log K_{sc}-log Q regression residuals was observed.
(2) Q = stream discharge, in cubic feet per second (ft^3/s).
K_{sc} = specific conductance, in micromhos per centimeter at 25 degrees C.
Trend analysis was carried out on log-transformed data.

Table 9.--Changes in levels of specific conductance adjusted for differences in levels of stream discharge for stations having shifts in logarithmic conductance-discharge regression functions.

Sequence Code	Survey station number	mean Q (log units)	mean K_{sc} (log units)	Period 1 log K_{sc}	Period 1 K_{sc}	Period 2 log K_{sc}	Period 2 K_{sc}	Estimate of change Absolute	Estimate of change Relative	Type
03	01474500	3.37423	2.48860	2.45437	285	2.54672	352	+67	+23.5	D
30	06308500	2.59780	2.84142	2.80359	636	2.87389	748	+112	+17.6	D
33	06807000	4.53982	2.83266	2.81140	648	2.85433	715	+67	+10.3	D
40	07164400	3.71892	3.35156	3.39830	2502	3.26142	1826	-676	-27.0	I
43	07245000	3.57406	3.00133	3.27194	1870	2.81552	654	-1216	-65.0	I
44	07263500	4.52176	2.79536	2.86880	739	2.74102	551	-188	-25.4	I
54	08123800	1.35552	3.18763	3.06436	1160	3.34202	2198	+1038	+89.5	D
56	08158000	3.18123	2.67249	2.63680	433	2.70826	511	+78	+18.0	D
59	08176500	3.05304	2.70516	2.80315	636	2.66856	466	-170	-26.7	I
66	09152500	3.34186	2.94965	2.98107	957	2.93296	857	-100	-10.5	I
68	09234500	3.24738	2.84653	2.77853	601	2.89347	783	+182	+30.3	D
69	09251000	3.14206	2.40440	2.37450	237	2.43441	271	+34	+14.4	D
79	11303500	3.42576	2.61928	2.57055	372	2.64579	442	+70	+18.8	D
81	11530500	4.25420	2.11710	2.09727	125	2.15180	142	+17	+ 3.6	D
87	13212500	3.04259	2.54187	2.52061	332	2.55173	356	+24	+ 7.2	D

Notes: For delineation of periods 1 and 2, see table 7.

K_{sc} values for periods 1 and 2 are determined from split- sample regression analysis of annual values; hence, they will differ from those values reported in table 9.

Mean Q values were used as values of the independent variable in the regressions to obtain K_{sc} for periods 1 and 2.

Type: D = degradation; I = improvement.

DISCUSSION

The scope of this report unfortunately cannot include detailed descriptions of all possible causes of observed areal variations and significant time-changes in stream temperatures and streamflow chemical quality. In this section of the report, we will only highlight interpretations of several aspects of the results given in the previous section and to allude to possible data problems involved in judging these interpretations. In the next (final) section of the report, several suggested considerations in planning and implementing water-quality data programs are made with areal and temporal assessment functions in mind as were attempted in this study.

Stream Temperature

The areal patterns in the harmonic-coefficient characterization of stream temperature (see figures 4 and 5, for example) revealed no radical departures from those patterns reported by Blakey (1966). The prolific problem of missing values and gaps of record inherent in available daily records of stream temperature supports the indirect approach advocated for this assessment; that is, evaluating areal patterns and temporal changes using the harmonic coefficients rather than directly averaging the available data. It is recognized that different functional relationships for characterizing annual variations in stream temperature might have been used (such as multiple harmonics or varying periodicities in response to extended periods of at- or below-freezing stream temperatures. However, for purposes of this assessment, it was felt that simple harmonic analysis was sufficient and that the application of the same form of analysis for all station records had the benefit of producing coefficients for each station that could be readily compared.

The most pronounced temporal changes observed for available records of stream temperatures could be attributed to changes imposed by increased regulation of stream systems, in most cases. In particular, the observed decrease in the annual variability in stream temperatures (as depicted by harmonic coefficient A, table 7) for the Gunnison River near Grand Junction, Colorado (station number 09152500), might be attributed to the installation and operation of Blue Mesa Reservoir (Robert Brennan, oral comm., 1973). The filling of this reservoir (beginning about October 1965) exactly coincided with the break in the record for A that was noted by visual inspection.

A significant reduction in the time-series values of A and A+M coefficients was observed for the Bighorn River at Bighorn, Montana (station number 06294700, table 7). This might be attributed to the influence of numerous (14) reservoirs upstream from this station location, most notably Yellowtail Reservoir forming Bighorn Lake (L.R. Frost, oral comm., 1973). The significant change in time-series values for this station (between 1966 and 1967 water years) was close to that observed for A+M depicted for temperature data for the Yellowstone River near Sidney, Montana (station number 06329500). The Bighorn and Tongue Rivers are major tributaries to the Yellowstone River, and the lower observed reduction in A+M values at the downstream Yellowstone site (code 31, figure 1) reflects the partial-compensating changes of A+M for the Tongue and Bighorn River tributaries (table 7). Note that the Yellowstone River upstream from the Bighorn (at Billings, Montana, station number 06214500) had no significant time change in harmonic coefficient characteristics (code 28, figure 1).

The Colorado River at Lees Ferry (station number 09380000, code 74) exhibited the greatest reduction in A and A+M time-series values (table 7), with the observed changes taking place between 1962 and 1963. This effect upon the thermal regime can be attributed to a large extent to the effect on stream temperature of releases from Lake Powell (Glen Canyon). A similar effect might have been noted downstream on the Colorado at station number 09421500 (code 75 below Hoover Dam) had stream-temperature data been available prior to as well as after construction of that dam. The apparent changes in thermal characteristics (appendix C, based upon visual inspection of the time series of harmonic coefficients) on the Green River near Greendale, Utah (station number 09234500, code 68, just below Flaming Gorge Reservoir), for the available 6 years of record were not significant at the chosen confidence level, even though available data in the analysis included years before and after reservoir construction.

The Boise and upper Snake Rivers are highly regulated, which might explain the observed lowering of harmonic mean temperatures between the 1964 and 1965 water years (station numbers 13154500 and 13212500, codes 86 and 87, table 7 and figure 1). On the other hand, no changes in stream regulation were known to have caused the observed changes in the three streams in Texas (station numbers 08082500, 08123800, and 08164500; codes 53, 54, and 58; table 7). In at least the third case (Navidad River near Ganado, Texas), a change in measurement strategy for stream temperatures is suspected; the absolute reduction in M and A+M time-series observed between the 1965 and 1966 water years is within the range of diurnal fluctuations if measurements by the daily observer were consistently shifted from the afternoon to the morning as has been suspected (J. F. Blakey, oral comm., 1973). This form of uncertainty points out the need to document thoroughly the types of records collected; assignment of existing statistical codes for computer-filé storage has been misused, to some extent. No explanation can be given for the relatively large reduction in annual temperature variability (as given by A) observed for the Brazos River at Seymour, Texas (station number 08082500, code 53) (J. F. Blakey, oral comm., 1973).

The observed long-term increase in A+M for the Delaware River at Trenton, N.J. (station number 01463500, code 02, table 7) may be due to increased regulation of upstream tributaties causing reduction in long-term flows before and after the mid-1950's (see table 10); however, the observed change may be due to shifting in available daily temperature data between daily mean and daily maximum records (see appendix C). The thermal changes observed at the three Florida stations (02277000, 02313000, and 02321500; codes 13, 16, and 18) included in the study are relatively small and cannot be attributed to increased stream regulation over the available periods of record.

Streamflow Chemical Quality

As mentioned in the introduction to this report, of major concern are significant changes in streamflow quality over time. Despite certain data deficiencies, changes in dual long-term time-series of specific conductance and stream discharge for many of the stations included in this assessment can be related to known changes having taken place in the river basin. Numerous examples for documenting observed changes in streamflow chemical quality (tables 9-11) with various reported causal effects are given below.

Only two of the 23 station records in this assessment located in the eastern half of the United States (figure 1, p. 9) indicated significant temporal changes. Salinity degradation of the Schuylkill River at Belmont Place, Philadelphia, Pa., (station 01474500) undoubtedly is influenced by increased effects of acid-mine drainage. Corresponding increases in concentrations of individual constituents may be noted for this station (appendix D) in the period of record between the 1962 and 1963 water years. In contrast, additional reservoirs with subsequent water-supply diversions from the Delaware River system (as indicated at station 01463500) have combined to cause a slight increase in dissolved-solids concentrations in streamflow (as indicated by specific conductances). In this case, no salinity increase was noted other than that due to reduction in flows (table 10). Plotted values of specific conductance versus stream discharge (log-transformed) at the Delaware station are given in figure 6 and indicate no discernible shifting of data points upwards or downwards in the time series (figure 6). However, a double-mass plot (figure 7) of the same data shows a slight upward rise which might be taken as a trend in time irrespective of long-term flow conditions.

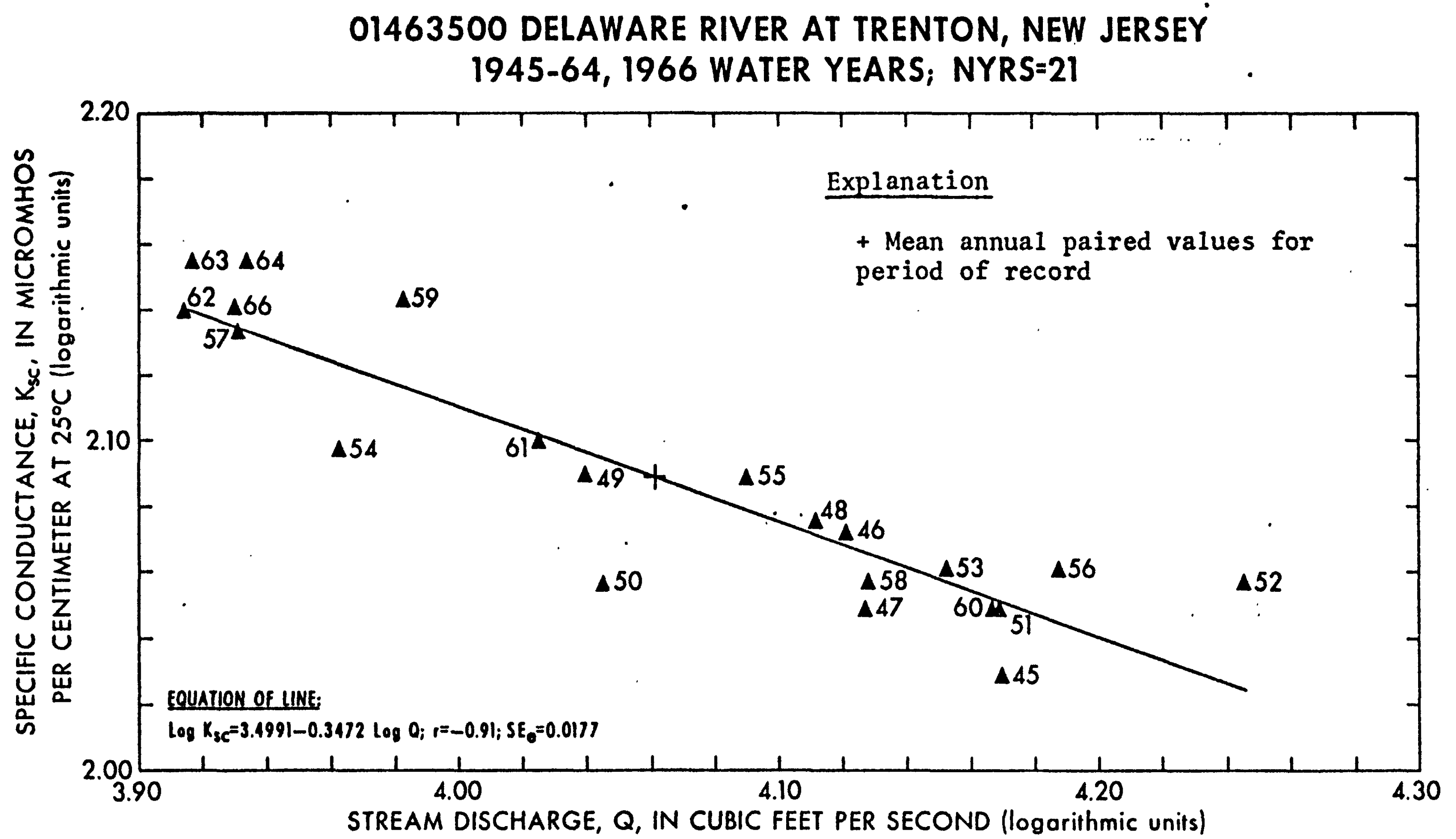

Figure 6.--Specific conductance - stream discharge regression relationship, Delaware River at Trenton, New Jersey (station 04163500).

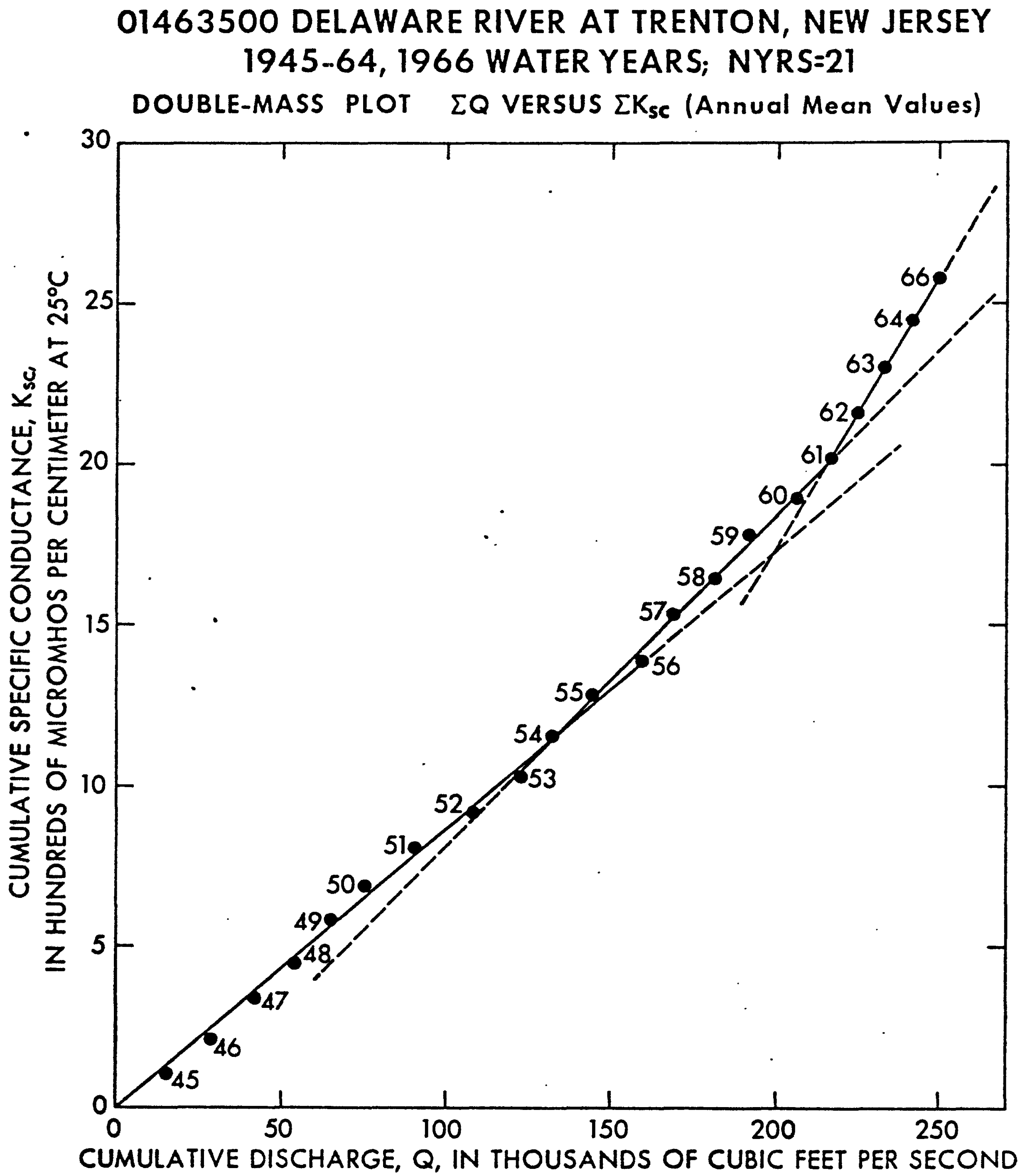

Figure 7.--Specific conductance - stream discharge double-mass plot, Delaware River at Trenton, New Jersey (station 04163500).

Streamflow quality changes were noted at two locations within the Missouri River system--Tongue River at Miles City, Mont. and Missouri River at Nebraska City, Nebr. (tables 9 and 11, figure 1, codes 30 and 33, station numbers 06308500 and 06807000, respectively). Inasmuch as no corresponding change was observed at an intermediary site, Yellowstone River near Sidney, Mont., (code 31, station 06329500) the salinity changes must be attributed to localized increased irrigation practices taking place in the basins immediately upstream from the sampling stations.

Significant salinity pollution abatement has been noted in the lower Arkansas River system including major tributaries in Oklahoma where primarily gypsum-bearing springs have been impounded and flows of brine effluents for oil fields into stream channels have been severely curtailed. Impacts due to those changes have resulted in indicated improvements in the Arkansas River (near Tulsa, Okla. and at Little Rock, Ark.) and in the Candian River near Whitefield, Okla. (sequence codes 40, 44, and 43, for station numbers 07164400, 07263500, and 07245000 , respectively; tables 9 and 11). Relatively complex processes in chemical equilibrium in the impounded Lake Keystone on the Arkansas 5.1 mi. (8.2 km) upstream from station number 07164400 may also be a factor (Falls and Varga, 1973). No significant time changes were observed at the two major upstream tributaries to Lake Keystone (Arkansas River at Arkansas City, Kansas, and Cimarron River at Perkins, Oklahoma); however, several other smaller streams flow into the Arkansas River between mainstem stations 07161000 and 07164400. The persisting improvement in streamflow chemical-quality conditions for the

Arkansas at Little Rock (station number 07263500 with sequence code 44) probably reflects the significant and larger upstream quality improvements observed at station numbers 07164400 and 07245000, despite intervening flows from the Verdigris (07178600) and Neosho (07193500) Rivers flowing into the Arkansas between the above mainstem stations (codes 41 and 42, respectively, figure 1).

Contrasting graphical depiction of time-changes of streamflow chemical-quality conditions are indicated by figures 8 and 9, using available annual mean specific-conductance and stream-discharge data for station 07245000 (code 43). In conformance with the definition of time changes and of the evaluation technique used in this report, figure 8 indicates a pronounced shifting downwards of the specific conductance - stream discharge relationship between the split-sample of paired values for the period of record (regression lines B and C, respectively, figure 8). On the other hand, shorter-term oscillations indicated on the double-mass plot of the same data values (figure 9) do not provide conclusive evidence of any time-trend for the period of record and further indicate certain limitations in basing inferences on this method.

The compensating flow decrease versus specific-conductance increase noted for the Red River at Dennison Dam near Dennison, Texas, (station number 07331600, code 46, table 10) is analogous to the observed change for the Delaware River. In both cases, highly regulated stream systems are being considered in the analysis.

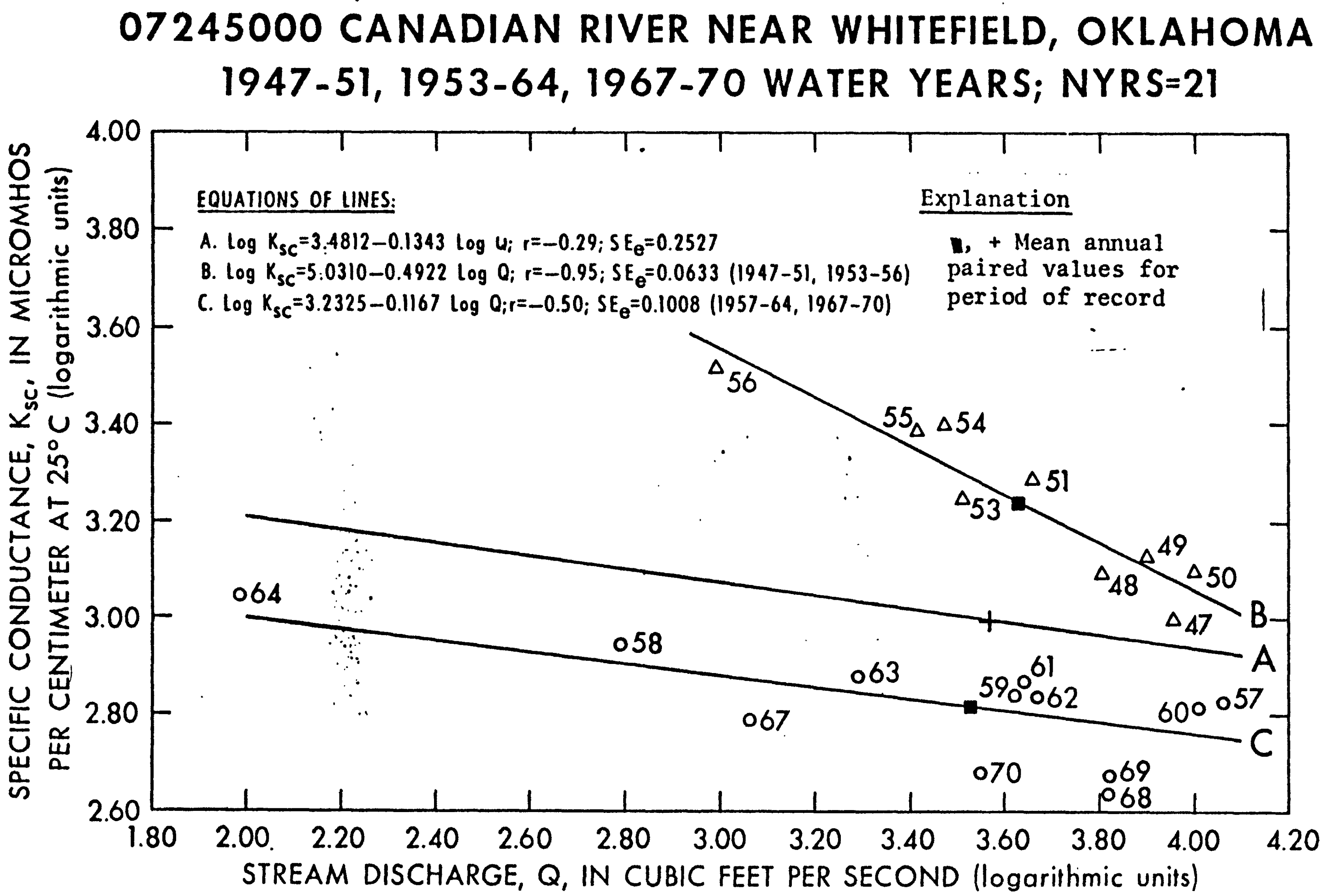

Figure 8.--Specific conductance - stream discharge regression relationships, Canadian River near Whitefield, Oklahoma (station 07245000).

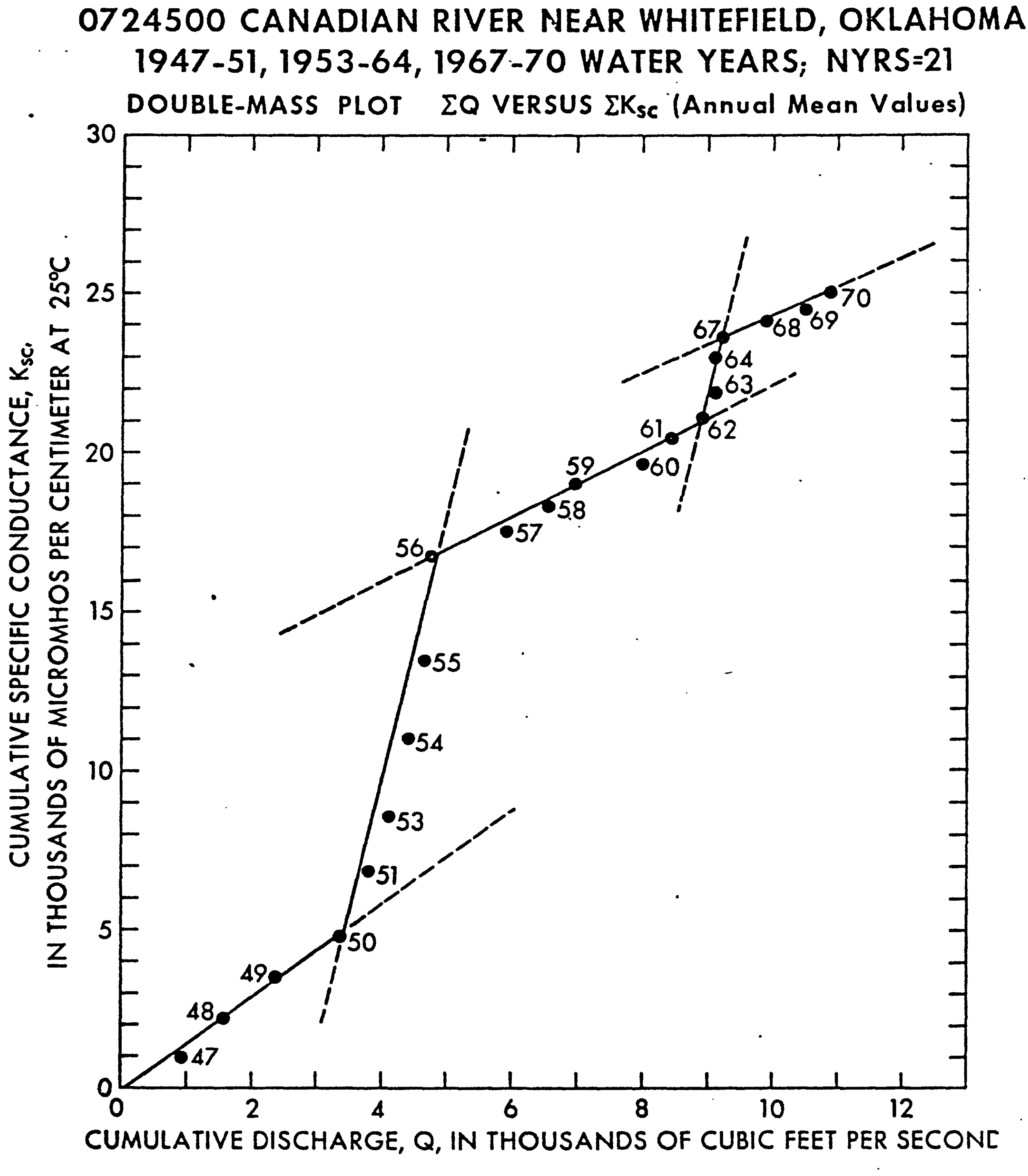

Figure 9.--Specific conductance - stream discharge double-mass plot, Canadian River near Whitefield, Oklahoma (station 07245000).

Records for three Texas streams used in the assessment study exhibited significant time changes. The most pronounced salinity changes of the 10 station records exhibiting net increases in solute concentrations (as indicated by specific conductance) occurred at the Beals Creek site (station 08123800, code 54, table 11), where increased effects of oil-field brines in the stream system have been noted (J. F. Blakey, oral comm., 1973). No specific cause for the observed significant increase in specific conductances in the Colorado River at Austin, Texas, could be found (station 08158000, code 56, table 11). However, this river system is highly regulated and it should be noted that no significant time changes were indicated for upstream and downstream mainstem stations on the Colorado River (Texas) (stations 08126800 and 08162000, sequence codes 55 and 57, respectively, table 8). The significant decrease in specific conductances for the Guadalupe River at Victoria, Texas, could be attributed to the recent practice of well-injection rather than surface-water disposal of oil-field brines (Blakey and others, 1972).

In the Rio Grande basin (WRC region 13), two of the three station records exhibited compensating significance changes in both specific conductance and stream discharge (table 10). In the case of the Rio Grande Conveyance Canal at San Marcial, N.M. (station 08358300, code 64), increases in mean annual flows resulted in significant decreases in mean annual specific conductances between two alternative split-sample periods (sequence codes 64a and 64b, table 10). In contrast, the opposite reversing time trends (decreasing stream discharge, increasing specific conductance) were observed for the Pecos River at Red Bluff, N.M. (station 08407500, code 65), which is located above Red Bluff Dam near the New Mexico-Texas state-line. Upstream from this station on the Pecos, significant net decreases in specific conductances (that is, adjusted for flow conditions) have been observed at two long-term water-quality stations (08386000 and 08396500) operated by the Geological Survey; whereas, no time trends were observed for the Pecos River below Red Bluff Dam, Texas (station 08410100) (Steele and Gilroy, 1971).

Records of specific conductance at three stations in the upper Colorado River basin exhibited significant time changes. A significant decline in specific conductances in the Gunnison River near Grand Junction (station 09152500, code 66) might be due, in part, to the construction of Blue Mesa Reservoir above the site. This reservoir began filling in October 1965 (Robert Brennan, oral comm., 1973), which corresponds with the observed shift in residuals for the specific conductance - stream discharge regression (appendix G). Salinity changes in excess of 30 percent was shown using available records for the Green River at Greendale (station 092345000, code 68, table 11), corresponding to an absolute increase in mean annual specific conductance of 182 micromhos per centimeter (at 25°C). This is contrasted with a reported 32 percent increase in dissolved-solids concentration of the same station (Madison and Waddell, 1973) caused by impoundment of the water by Flaming Gorge Reservoir, comparable to an increase in 130 mg/l in dissolved solids (equivalent to about 200 micromhos per centimeter assuming a DS:K_{sc} ratio conversion of 0.65). Hence, the results of two time-change evaluation techniques performed independently agree to within 10 percent. Most of the salinity increase at this Green River site is believed attributable to leaching of minerals from the reservoir bottom (Madison and Waddell, 1973). Figure 10 shows graphically the results of the method of analysis

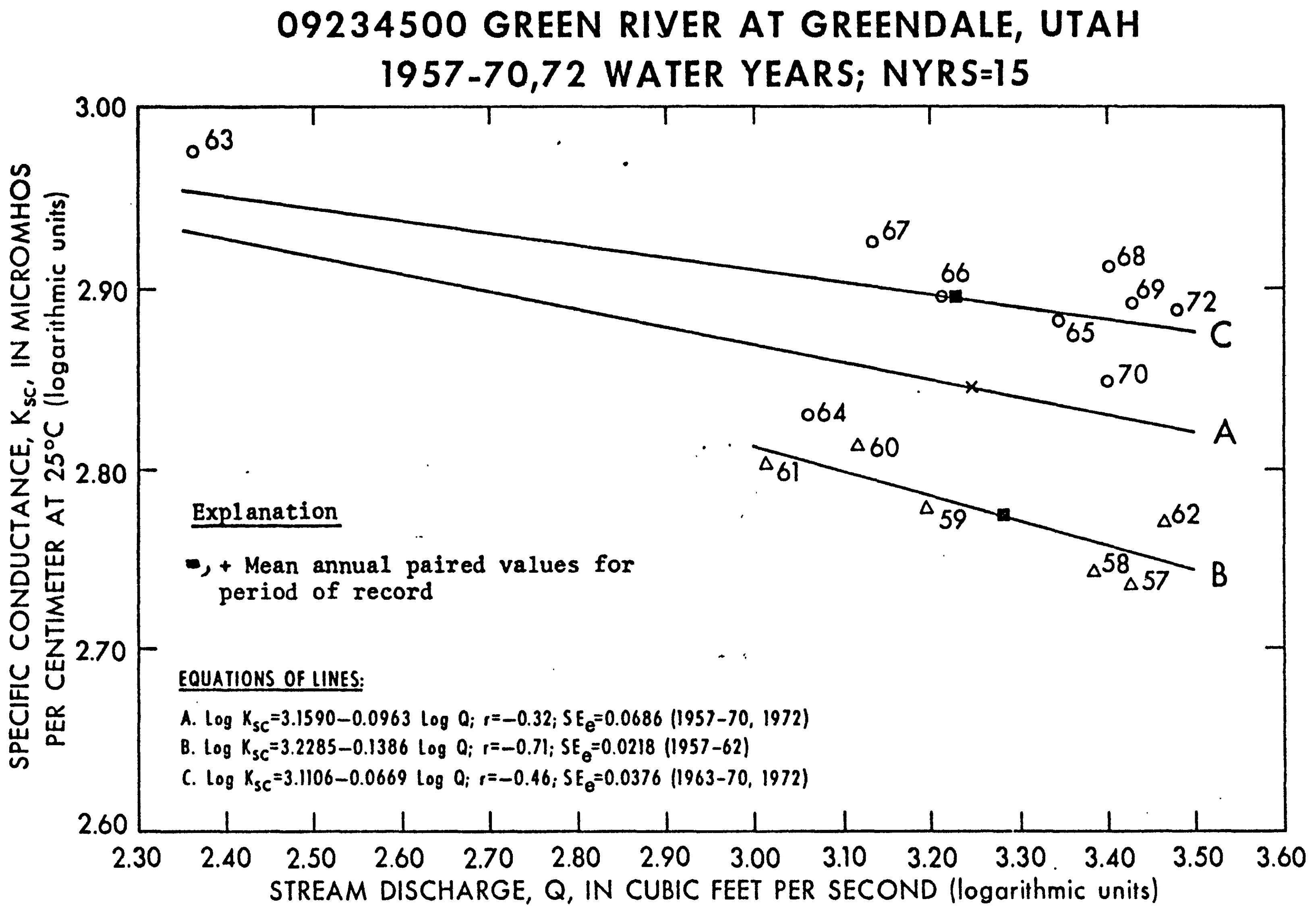

Figure 10.--Specific conductance - stream discharge regression relationships, Green River at Greendale, Utah (station 09234500)

used for the assessment study reported here. A major part of the annual flows appears to have been retained by the reservoir in 1963; nonetheless, after the 1964 water-year, the plotted annual values were consistently above the regression relationship determined for the entire period of record (line A, figure 10). Note that no significant time changes were apparent at the downstream station, Green River at Green River, Utah (station 09315000, code 71, table 8). A lesser degree of degradation of the Yampa River near Maybell (station 09251000, code 69) partly may have been caused by increased use of irrigation waters in the upstream areas.

Significant salinity changes were indicated in two of the four California streams included in the assessment study. The San Joaquin River near Vernalis (station 11303500, code 79) increasingly has been affected by irrigation return flows due to intensified agrucultural development in the basin. The net salinity increase of the San Joaquin at this site, based upon available data, was nearly 19 percent (table 9) between the two periods determined by analysis of the regression residuals. For the Klamath River near Klamath (station 11530500, code 81), the net increase in specific conductances has been minor, less than four percent (table 11), after masking out the effects of the apparent decline in mean annual flows (appendix E, table 9). This latter change is probably the result of interbasin transfer of water from the Trinity River to the Sacramento River since April 1963 (D. R. Dawdy, written comm., 1974).

Specific conductances in the Boise River at Notus, Idaho (station 13212000), have increased more than 7 percent, with the noticeable transition break occurring in the mid-1950's. In recent years, summer low-flow releases from the several reservoirs on this highly regulated river system have been infrequent, resulting in the contribution of irrigation return flows as the dominant low-flow source at the sampling site.

FUTURE STUDIES

Modifications or expansions of the approach of this preliminary assessment reported here might be suggested. After completion of an exercise of this magnitude and nature, one always finds with hindsight that he might have done specific tasks quite differently. In this section, several (but certainly not all) aspects of the present study warranting further scrutiny and evaluation are discussed.

The annual paired K_{sc}-Q data values used in the analysis of time changes were obtained from a variety of types and frequencies of analytical determinations (see appendix B-2). More consistency (hence less uncertainty) in representation of annual paired values would have been provided by utilizing, where possible, concurrent daily records of specific conductance and stream discharge for the time-trend analyses. This alternative data analysis was not carried out for the present study for several reasons: (1) unavailability of appropriate data in computer files, (2) fewer station years with daily records, and (3) no available discharge-weighting annual summary computer program. At some future time, several comparisons could be made to check the annual K_{sc} values obtained from discrete monthly measurements against daily records for identical station years where such data are collected concurrently.

The "current status" or areal summary sections of this report were not utilized by CEQ in their fourth annual report. They expressed concern over the number of years (7) used to depict current conditions in water quality nationwide (1966-72 water years, table 3). Data for the complete 1973 water year were not available; data for 1972 commonly lacked discharge or other data values or were affected by transcriptional or unchecked analytical errors. For this study, relative emphasis was given on the time-trend analysis, resulting in data for a fewer number of water-quality stations to be included. In subsequent studies placing more emphasis for depicting areal variations in current quality, a larger number of station records and summary of additional variables might be considered. If a shorter "current" period of record is selected, concern for short-term fluctuations in annual stream discharges with resultant effects on many quality variables must somehow be discounted or else taken into consideration.

This study points to the pressing need to strive for more consistency in the design and execution of sample-collection and analytical operations at stations included in networks for assessment of significant long-term changes. In this assessment study, we have glossed over errors inherent in annual time series in changing type of collection (for example, compositing to grab) or modifying sampling or analytical frequencies (see appendix B-2). Effects of variable year-to-year numbers of samples or numbers of analyses will necessarily affect inherent reliability of annual sample statistics.

We have assumed throughout the study that, for a given station, consistency in field-sampling procedures and analytical methods used in the laboratory carried through the period of record. If changes in techniques have occurred to introduce systematic errors in earlier determinations, even if for the better (or more "representative"), the results of time-series analyses will lead to anomalous conclusions in drawing inferences from these analyses.

Somewhat innovative techniques have been suggested in this report for summary and analysis of both stream-temperature data and for distinguishing changes in conservative constituents caused by or in spite of changes of stream discharges. The nonparametric Kendall's tau ranking procedure and Mann-Whitney test for significance appear to be viable tools for time-trend analysis of water-quality data. Variations of these tests and more extensive comparisons of these with more "traditional" methods could be carried out. When ambiguous results of alternative statistical methods occur, selection of the most objective approach must consider the underlying assumptions of each procedure as well as certain inadequacies of the sets of actual data undergoing analysis.

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AN ASSESSMENT OF AREAL AND TEMPORAL VARIATIONS IN STREAMFLOW QUALITY USING SELECTED DATA FROM THE NATIONAL STREAM QUALITY ACCOUNTING NETWORK

by

Timothy Doak Steele

Edward J. Gilroy and

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Appendices to Report

Reston, Virginia
August 1974

Appendix A.--Descriptions of NASQAN stations used in the assessment

WRC Region	Sequence Code	USGS Station Number	Station Description	Drainage Area (sq. mi.)	OWDC Code
01 08	1	01184000	Connecticut River at Thompsonville, Connecticut	9,661	63528
02 04	2	01463500	Delaware River at Trenton, New Jersey	6,780	51178
02 04	3	01474500	Schuylkill River at Belmont Place, Philadelphia, Pennsylvania	1,893	54003
02 06	4	01491000	Choptank River near Greensboro, Maryland	113	54245
02 08	5	01673000	Pamunkey River near Hanover, Virginia	1,072	62934
03 02	6	02083500	Tar River at Tarboro, North Carolina	2,140	52159
03 04	7	02129000	Pee Dee River near Rockingham, North Carolina	6,870	52371
03 09	8	02252500	North Canal near Vero Beach, Florida	N.A.*	53136
03 09	9	02253000	Main Canal at Vero Beach, Florida	N.A.	53137
03 09	10	02253500	South Canal near Vero Beach, Florida	N.A.	53138
03 09	11	02256500	Fisheating Creek at Palmdale, Florida	311	53139
03 09	12	02273200	Canal 41A above S68 at Lake Isotkpoga near Lake Placid, Florida	N.A.	53150
03 09	13	02277000	St. Lucie Canal near Lock near Stuart, Florida	N.A.	53152
03 09	14	02285000	North New River near Fort Lauderdale, Florida	N.A.	53166
03 10	15	02296750	Peace River at Arcadia, Florida	1,367	53204
03 10	16	02313000	Withlacoochee River near Holder, Florida	1,710	53270
03 11	17	02320500	Suwannee River at Bradford, Florida	7,740	53273
03 11	18	02321500	Santa Fe River at Worthington, Florida	630	53274

* Drainage area not applicable or indeterminant

Region	Code	Number	Station Description	Area (sq. mi.)	Code
03 18	19	02489500	Pearl River near Bogalusa, Louisiana	6,630	53935
05 01	20	03049655	Allegheny River at Oakmont, Pennsylvania	11,520	70018
05 10	21	03251500	Licking River at McKinneysburg, Kentucky	2,326	50159
05 08	22	03276600	Great Miami River at Elizabethtown, Ohio	5,356	50878
05 09	23	03277200	Ohio River at Markland Dam near Warsaw, Kentucky	83,170	50161
09 02	24	05054000	Red River of the North at Fargo, North Dakota	6,800	50528
09 02	25	05082500	Red River of the North at Grand Forks, North Dakota	30,100	50541
09 01	26	05124000	Souris River near Westhope, North Dakota	17,600	56367
10 06	27	06185500	Missouri River near Culbertson, Montana	91,557	51115
10 07	28	06214500	Yellowstone River at Billings, Montana	11,795	51122
10 08	29	06294700	Bighorn River at Bighorn, Montana	22,885	51125
10 09	30	06308500	Tongue River at Miles City, Montana	5,379	51126
10 10	31	06329500	Yellowstone River near Sidney, Montana	68,812	51127
10 16	32	06478500	James River near Scotland, South Dakota	21,550	50549
10 23	33	06807000	Missouri River at Nebraska City, Nebraska	414,400	50381
10 26	34	06877600	Smoky Hill River at Enterprise, Kansas	19,200	50250
10 27	35	06887000	Big Blue River near Manhattan, Kansas	9,560	50254
10 27	36	06892500	Kansas River at Bonner Springs, Kansas	59,890	50262

WHO Region	Sequence Code	USGS Station Number	Station Description	Drainage Area (sq. mi.)	OWDC Code
12 09	56	08158000	Colorado River at Austin, Texas	38,400	52823
12 09	57	08162000	Colorado River at Wharton, Texas	41,380	52825
12 10	58	08164500	Navidad River near Ganado, Texas	1,116	52826
12 10	59	08176500	Guadalupe River at Victoria, Texas	5,161	52827
12 10	60	08188500	San Antonio River at Goliad, Texas	3,921	52828
12 10	61	08189500	Mission River at Refugio, Texas	690	52830
12 11	62	08211000	Nueces River near Mathis, Texas	16,660	52831
13 02	63	08313000	Rio Grande at Otowi Bridge near San Ildefonso, New Mexico	14,300	52548
13 02	64	08358300	Rio Grande Conveyance Canal at San Marcial, New Mexico	N.A.	52562
13 06	65	08407500	Pecos River at Red Bluff, New Mexico	19,540	52585
14 04	66	09152500	Gunnison River near Grand Junction, Colorado	7,928	51252
14 06	67	09180500	Colorado River near Cisco, Utah	24,100	50932
14 01	68	09234500	Green River near Greendale, Utah	15,100	50937
14 02	69	09251000	Yampa River near Maybell, Colorado	3,410	51254
14 02	70	09306500	White River near Watson, Utah	4,020	50939
14 03	71	09315000	Green River at Green River, Utah	40,600	50943
14 07	72	09368000	San Juan River at Shiprock, New Mexico	12,900	52591
14 08	73	09379500	San Juan River near Bluff, Utah	23,000	50945
14 08	74	09380000	Colorado River at Lees Ferry, Arizona	107,900	54394
15 02	75	09421500	Colorado River below Hoover (Boulder) Dam, Nevada	167,000	54403

WRC Region	Sequence Code	USGS Station Number	Station Description	Drainage Area (sq. mi.)	OWDC Code
15 05	76	09502000	Salt River below Stewart Mountain Dam, Arizona	6,232	54415
15 05	77	09510000	Verde River below Bartlatt Dam, Arizona	6,185	54416
18 07	78	11152500	Salinas River near Spreckels, California	4,157	66196
18 04	79	11303500	San Joaquin River near Vernalis, California	13,540	51508
18 01	80	11477000	Eel River at Scotia, California	3,113	51658
18 01	81	11530500	Klamath River near Klamath, California	12,100	51679
17 15	82	12031000	Chehalis River at Porter, Washington	1,294	51906
17 14	83	12200500	Skagit River near Mount Vernon, Washington	3,093	51963
17 03	84	12433000	Spokane River at Long Lake, Washington	6,020	51977
17 04	85	12510500	Yakima River at Kiona, Washington	5,615	51996
17 05	86	13154500	Snake River at King Hill, Idaho	35,800	54207
17 06	87	13212500	Boise River at Notus, Idaho	3,820	54208
21 00	88	50071000	Rio Fajardo near Fajardo, Puerto Rico	14.9	54342

WRC Region	Sequence Code	USGS Station Number	Station Description	Drainage Area (sq. mi.)	OWDC Code
15 05	76	09502000	Salt River below Stewart Mountain Dam, Arizona	6,232	54415
15 05	77	09510000	Verde River below Bartlatt Dam, Arizona	6,185	54416
18 07	78	11152500	Salinas River near Spreckels, California	4,157	66196
18 04	79	11303500	San Joaquin River near Vernalis, California	13,540	51508
18 01	80	11477000	Eel River at Scotia, California	3,113	51658
18 01	81	11530500	Klamath River near Klamath, California	12,100	51679
17 15	82	12031000	Chehalis River at Porter, Washington	1,294	51906
17 14	83	12200500	Skagit River near Mount Vernon, Washington	3,093	51963
17 03	84	12433000	Spokane River at Long Lake, Washington	6,020	51977
17 04	85	12510500	Yakima River at Kiona, Washington	5,615	51996
17 05	86	13154500	Snake River at King Hill, Idaho	35,800	54207
17 06	87	13212500	Boise River at Notus, Idaho	3,820	54208
21 00	88	50071000	Rio Fajardo near Fajardo, Puerto Rico	14.9	54342

APPENDIX 8-1.--SUMMARY OF AVAILABLE STATION RECORDS ON STREAM TEMPERATURE.

CO NO	STATION NUMBER	NYRS	WATER YEAR 72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
1	01184000	4	X	X	X	X																								
2	01463500	26	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3	01474500	8				X	X		X	X	X	X		X	X															
5	01673000	5	X	X	X	X																							X	
6	02083500	5						X	X	X	X	X																		
7	02129500	7						X	X	X	X	X	X	X																
11	02256500	7		X	X	X	X	X	X	X																				
12	02273200	6			X	X	X	X	X	X																				
13	02277000	7		X	X	X	X	X	X	X																				
14	02285000	7		X	X	X	X	X	X	X																				
15	02296750	5		X	X	X	X	X																						
16	02313000	8			X	X	X	X	X	X														X	X					
17	02320500	7		X	X	X	X	X	X	X																				
18	02321500	11		X	X	X	X	X	X	X		X	X	X	X															
19	02489500	6				X		X	X	X	X	X																		
20	03049655	6			X	X		X	X	X	X																			
21	03251500	12		X	X	X	X	X	X	X	X	X	X	X	X															
22	03276600	12		X	X	X	X	X	X	X	X	X	X	X	X															
23	03277200	11			X	X	X	X	X	X	X	X	X	X	X															
24	05054000	12		X	X	X	X	X	X	X	X	X	X	X	X															
25	05082500	12		X	X	X	X	X	X	X	X	X	X	X	X															
26	05124000	7					X	X			X	X	X	X	X															
27	06185500	5			X	X	X	X	X																					
28	06214500	7			X	X	X	X	X	X	X																			
29	06294700	11			X	X	X	X	X	X	X	X	X	X	X															
30	06308500	11			X	X	X	X	X	X	X	X	X	X	X															
31	06329500	11			X	X	X	X	X	X	X	X	X	X	X															
32	06478500	10				X	X	X	X	X	X	X	X	X	X															
33	06807000	20		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
34	06877600	11			X	X	X	X	X	X	X	X	X	X	X															
36	06892500	2										X	X																	
38	07146500	11			X	X	X	X	X	X	X	X	X	X	X															
39	07161000	9			X	X	X	X	X			X	X	X	X															
40	07164400	11			X	X	X	X	X	X	X	X	X	X	X															
41	07178600	9			X	X	X			X	X	X	X	X	X															
42	07193500	4										X	X	X	X															
43	07245000	9			X	X	X	X			X	X	X	X	X															
44	07263500	24				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
45	07331000	11			X	X	X	X	X	X	X	X	X	X	X															
46	07331600	10		X		X	X	X		X	X	X	X	X	X															
47	07344400	8						X	X	X	X	X	X	X	X															
48	07367000	5	X	X	X	X	X																							

APPENDIX B-1.--SUMMARY OF AVAILABLE STATION RECORDS ON STREAM TEMPERATURE-

WATER YEAR

CD NO	STATION NUMBER	NYRS	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
49	08030500	12		X	X	X	X	X	X	X	X	X	X	X	X															
50	08041000	11		X	X	X	X	X		X	X	X	X																	
51	08065350	8		X	X	X	X	X	X	X	X																			
52	08068000	10		X	X	X	X	X	X	X	X	X	X																	
53	08082500	12		X	X	X	X	X	X	X	X	X	X	X	X															
54	08123800	12		X	X	X	X	X	X	X	X	X	X	X	X															
55	08126500	10		X	X	X	X	X	X	X	X	X	X																	
56	08158000	12		X	X	X	X	X		X	X	X	X	X	X		X													
57	08162000	11		X	X	X	X	X		X	X	X	X	X	X															
58	08164500	12		X	X	X	X	X	X	X	X	X	X	X	X															
59	08176500	11		X	X	X	X	X		X	X	X	X	X	X															
60	08188500	12		X	X	X	X	X	X	X	X	X	X	X	X															
61	08189500	9		X	X	X	X	X	X	X	X	X																		
62	08211000	11		X	X	X	X	X	X		X	X	X	X	X															
63	08313000	8			X		X	X	X	X	X	X	X																	
64	08358300	11			X	X	X	X	X	X	X	X	X	X	X															
65	08407500	11			X	X	X	X	X	X	X	X	X	X	X															
66	09152500	12	X		X		X	X	X	X	X	X	X	X	X	X														
67	09180500	14	X		X			X	X	X						X		X	X	X	X	X	X	X	X					
68	09234500	6			X			X		X	X		X			X														
69	09251000	11			X	X		X	X	X	X	X	X	X	X	X														
70	09306500	13	X		X	X	X	X	X	X	X	X	X	X	X	X														
71	09315000	14	X		X			X	X	X						X		X	X	X	X	X	X	X	X					
72	09368000	12			X	X	X	X	X	X	X	X	X	X	X	X														
73	09379500	7	X		X			X	X	X				X	X															
74	09380000	11			X	X		X	X	X	X	X	X	X	X	X														
76	09502000	11			X	X		X	X	X	X	X	X	X	X	X														
77	09510000	9			X	X				X	X	X	X	X	X	X														
78	11152500	3		X	X			X																						
79	11303500	4										X	X	X	X															
80	11477000	9			X	X	X	X	X		X	X			X	X														
81	11530500	6	X		X	X	X	X	X																					
82	12031000	11		X	X	X	X	X	X	X	X	X	X		X															
83	12200500	8			X	X	X	X	X	X	X	X																		
84	12433000	7			X	X	X	X					X	X	X															
85	12510500	13		X	X	X	X	X	X	X	X	X	X	X	X	X														
86	13154500	13	X	X	X	X		X	X	X	X	X	X	X	X	X														
87	13212500	13	X	X	X	X		X	X	X	X	X	X	X	X	X														

//

WATER YEAR

CD	STATION NUMBER	CL AS	NY RS	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
1	01184000	D	10	M	M	M	M	M	M	M										C		X	X																								
2	01463500	A	21	S	N	N	N	N	Z	C	S	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																
3	01474500	A	27	M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																	
4	01491000	D	8	M	M	M	M	M	M	M	M	Z																																			
5	01673000	D	9	R	M	M	D	Y												X	X	P	X	M						C	X																
6	02083500	C	11	X	Z	X	Z	X	C	C	C	C	C	C								C																									
7	02129000	C	12	X	X	X	X		C	C	C	C	C	C														C	C																		
8	02252500	B	16	X	X	X	X	X	X	X		M	M	R	M	M	M	M	M	M	M																										
9	02253000	B	17	X	X	X	X	X	X	X		M	M	M	M	M	M	M	M	M	M																										
10	02253500	B	17	X	X	X	X	X	X	X		M	M	M	M	M	M	M	M	M	M																										
11	02256500	D	8	X	X	N	Z	N	Y	M	X	X	M	M																																	
12	02273200	X	5	X	X	N	Z	N	M	X	X	P	P																																		
13	02277000	X	4	P	P	P	P	P	S	Z		R	M	M	M	M	R	R	R	R	R																										
14	02285000	X	3	P	P	P	P	P	Y	P	P	X									R				P						P	R	R	Y	R												
15	02296750	D	9	X	X	R	R	R	C	C	Q	C	C	Y	M	Z	X	P																												P	
16	02313000	D	9	Z	Z	N	N	R	P	X	Z	X	X	M	M	M	M	R	R	R	R	P		P	C	C																					
17	02320500	D	10	X	N	Z	Z	Z	Y	Y				M	M	M			C	C	C	C																									
18	02321500	D	7	X	M	N	N	R	S	X						C	M	C	Y																												
19	02489500	D	8	P	R	M	X	M	C	C	C	C	C																																		
20	03049655	X	4	N	M	N	N		Z	Z	M	M	Y																																		
21	03251500	C	12	M	M	N	M	M	N	N	C	C	C	C	C	C						C	C																								
22	03276600	C	12	U	U	U	U	U	T		T	T	T	T	T	T																															
23	03277200	D	6			V	V	V	V	V	U	U	U	T	T	T																															
24	05054000	B	17	M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C																											
25	05082500	B	16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																												
26	05124000	C	15	N	M	M	M	C	C			C	C	C	C	C	C	C	C	C	C																										
27	06185500	D	7	M	M	M	C	C	C	C	B																																				
28	06214500	B	17	M	M	M	C	C	C	C	C	B						C	C	C	C	C	C	C	C																						
29	06294700	A	22	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																						
30	06308500	A	22	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																						
31	06329500	A	22	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																						
32	06478500	D	8		N	M	M	M	B			M	M	M	M	M																															
33	06807000	A	21	M	M	M	M	M	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																						
34	06877600	C	12	A	M	M	M	C	C	C	C	C	C	C	N	N	N	C	C	C																											
35	06887000	C	13		M	M	M	M	M	M	M	M	M	M				C	C	C																											
36	06892500	D	10		M	M	M	M	M	M	M	C	C	C				A	A	A				A	A	A	A	A																			
37	07139500	D	7		N	M	M	N	M	M	N	M	M	M																																	
38	07146500	B	20		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C							A	A	A														
39	07161000	B	18		C	C	C	C	C	C	C		C	C	C	C	C	C	C	C	C	C	C																								
40	07164400	A	23	R	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			C																		
41	07178600	A	23	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																			
42	07193500	B	19			M	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C																							
43	07245000	A	21	A	Q	C	C	C	C			C	C	C	C	C	C	C	C	C	C	C	C	A	C	C	C	C	C																		
44	07263500*	A	26		M	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																	
45	07331000	A	22	Q	Q	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C				C		C																
46	07331600	A	27	Q	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																
47	07344400	B	16	M	M	M	X	M	C	C	C	C	C	C	C	C	C	C	C																												
48	07367000	D	6	N	N	N	N	M	N	M	M	M	M																																		

APPENDIX B-2.--SUMMARY OF AVAILABLE RECORDS ON STREAMFLOW CHEMICAL QUALITY-CONT

WATER YEAR

CD	STATION NUMBER	CL AS	NY RS	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
49	08030500	A	24	Q	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																			
50	08041000	A	24	Q	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																			
51	08065350	D	8	Q	C	C	C	C	C	C	C	C																																			
52	08068000	D	10	Q	C	C	C	C	C	C	C	C	C	C	A																																
53	08082500	C	12	Q	C	C	C	C	C	C	C	C	C	C	C	C																															
54	08123800	C	12	Q	Q	C	C	C	C	C	C	C	C	C	C	C	C																														
55	08126500	D	9	Q	Q	C	C	C	C	C	C	C	C	C	A																																
56	08158000	A	24	Q	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																			
57	08162000	A	27	Q	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																
58	08164500	C	12	Q	C	C	C	C	C	C	C	C	C	C	C	C																															
59	08176500	A	24	Q	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			C																	
60	08188500	C	13	Q	C	C	C	C	C	C	C	C	C	C	C	C	C																														
61	08198500	D	9	Q	Q	C	C	C	C	C	C	C	C	C	A																																
62	08211000	A	24	Q	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																			
63	08313000	A	26	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																		
64	08358300	B	19	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																									
65	08407500	A	35	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C									
66	09152500	A	39	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C					
67	09180500	A	38	M	N	N	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C					C	C	C	C	C	C	C	C	C	C	C	C	C	C
68	09234500	C	15	M	N	M	C	C	C	C	C	C	C	C	C	C	C	C	C																												
69	09251000	A	22	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																						
70	09306500	A	21	M	N	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																						
71	09315000	A	38	N	Z	N	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C					C	C	C	C	C	C	C	C	C	C	C	C	C	C
72	09368000	B	18	C	D	C	C	C	C	C	C	C	C	C	C	C	C	C													C	C	C	C													
73	09379500	A	42	M	N	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
74	09380000	A	29	M	Z	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C													C	C
75	09421500	A	22	C	C	C	C	C	R		R	N		C	C	C	C	C	C	C	C	C	C	C	C							C	C	C	C	C											
76	09502000	A	21	M	N	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																						
77	09510000	A	21	M	N	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																							
78	11152500	C	15	Z	A	Z	X	M	M	M	M	M	M	M	M	M	M	M				X	X	X																							
79	11303500	C	15	R	N	N	N	N	N	N	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C																						
80	11477000	B	20	N	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M																							
81	11530500	B	20	R	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	X	B																						
82	12031000	D	10	R	M	M	M	M	M	M	N	M	M	M	N	C																	A														
83	12200500	C	11			M	M	M	M	M	M	M	M	M	M	M																															
84	12433000	C	12	R	M	M	M	M	M	M	M	M	M	C	C	C																															
85	12510500	B	19	R	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																								
86	13154500	B	20	R	M	N	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																						
87	13212500	A	21	R	M	M	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C																						
88	50071000	C	11	M	M	M	M	M	M	M	M	M	M	M	B																																

Appendix B-2

EXPLANATION OF SYMBOLS

A - miscellaneous analyses only
B - partial year only

C - daily composited record
M - monthly grab record (≥ 6 samples)
X - periodic grab record (< 6 samples)
Y - mixed composite/grab (periodic)
T - time weighted (no Q), composites
U - time weighted (no Q), monthly

Q - composite, no Q
P - periodic, no Q
R - monthly grab, no Q
S - mixed, no Q

D - composite - error or no summary
N - monthly - error or no summary
Z - periodic, mixed error or no summary
* - Records for station 07263620 replaced those for 07263500 beginning in the 1970 water year

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.

NTYPE	STATION NO.	WY		N	A	C	M	SE	VAR
5	01184000	1969		176	12.65	2.42	13.38	1.42	97.45
5	01184000	1970		316	13.07	2.64	12.44	1.70	97.04
5	01184000	1971		328	13.09	2.53	12.68	2.13	95.15
5	01184000	1972		217	12.21	2.55	12.30	1.65	91.95
4	01463500	1945		363	10.80	2.77	12.88	2.26	91.93
4	01463500	1946		357	10.71	2.74	13.59	1.79	94.65
4	01463500	1947		361	11.47	2.58	13.23	1.91	94.75
4	01463500	1948		341	12.18	2.63	13.29	1.73	96.04
4	01463500	1949		365	12.02	2.74	14.41	1.99	94.65
4	01343500	1950		361	11.45	2.59	12.43	1.95	94.57
4	01463500	1951		365	11.01	2.68	13.92	1.48	96.30
4	01463500	1952		365	10.50	2.67	13.62	1.88	94.02
4	01463500	1953		333	10.65	2.71	13.86	2.08	93.04
4	01463500	1954	MX	365	13.55	2.71	14.32	2.19	94.77
4	01463500	1954	MN	365	12.08	2.74	12.09	1.90	95.13
4	01463500	1956	MX	286	12.93	2.61	13.28	2.15	95.56
4	01463500	1956	MN	286	11.97	2.64	11.55	1.88	95.99
4	01463500	1957	MX	329	14.30	2.77	15.48	2.08	96.09
4	01463500	1957	MN	329	12.41	2.77	13.14	2.02	95.18
4	01463500	1958	MX	358	13.58	2.61	14.50	1.92	96.23
4	01463500	1958	MN	358	12.24	2.65	12.46	1.82	95.83
4	01463500	1959	MX	333	14.72	2.76	14.87	2.11	95.84
4	01463500	1959	MN	333	13.18	2.76	12.85	1.83	96.11
4	01463500	1960	MX	351	12.30	2.70	14.47	2.16	94.67
4	01463500	1960	MN	361	12.10	2.69	12.92	1.96	95.08
4	01463500	1961	MX	348	14.46	2.65	14.25	2.34	95.00
4	01463500	1961	MN	348	12.89	2.65	12.35	1.95	95.63
4	01463500	1962		334	11.22	2.71	14.10	1.83	94.90
4	01463500	1963	MX	303	14.58	2.74	14.07	1.75	97.13
4	01463500	1963	MN	303	12.92	2.74	12.28	1.56	97.07
4	01463500	1964		357	10.94	2.67	14.56	1.72	95.29
4	01463500	1965	MX	328	14.08	2.71	15.73	2.12	95.60
4	01463500	1965	MN	328	12.49	2.74	13.27	2.01	94.98
4	01463500	1966		353	10.89	2.69	14.37	1.63	95.76
4	01463500	1967		351	10.28	2.65	13.92	1.85	94.05
3	01463500	1968	MX	289	13.08	2.72	14.24	2.24	94.04
3	01463500	1968	MN	283	12.15	2.74	12.71	1.99	94.35
3	01463500	1968		268	12.48	2.73	13.42	2.08	94.26
2	01463500	1969	MX	284	13.23	2.75	15.11	1.87	96.06
2	01463500	1969	MN	275	12.24	2.72	13.39	1.65	96.24
2	01463500	1969		249	12.73	2.73	14.25	1.67	96.51
2	01463500	1970	MX	281	14.21	2.67	13.86	1.91	96.27
2	01463500	1970	MN	261	13.24	2.66	12.17	1.80	95.65
2	01463500	1970		258	13.56	2.67	12.99	1.81	96.27
2	01463500	1971	MX	232	13.72	2.64	14.10	2.02	94.98
2	01463500	1971	MN	231	12.55	2.63	12.45	1.68	95.82
	01463500	1971		218	13.08	2.64	13.23	1.82	95.43

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	01474500	1960	362	12.31	2.67	15.31	2.11	94.43
5	01474500	1961	341	13.08	2.63	14.59	2.01	95.29
5	01474500	1963	360	13.08	2.77	14.40	1.55	97.26
5	01474500	1964	359	13.04	2.65	15.21	1.53	97.32
5	01474500	1965	355	11.34	2.60	16.73	1.73	95.57
5	01474500	1966	315	11.32	2.65	16.31	2.26	92.70
5	01474500	1968	307	12.84	2.74	15.48	2.03	94.84
5	01474500	1969	328	12.63	2.72	16.61	2.04	95.04
5	01673000	1946	363	9.92	2.83	13.24	2.35	89.95
5	01673000	1969	313	11.85	2.78	13.75	2.00	94.13
5	01673000	1970	356	12.53	2.79	14.67	1.58	96.93
5	01673000	1971	357	10.63	2.69	15.58	2.46	90.18
5	01673000	1972	365	9.46	2.71	15.12	2.24	89.96
5	02083500	1963	365	11.34	2.84	15.24	2.33	91.99
5	02083500	1964	364	11.06	2.86	15.38	2.16	92.90
5	02083500	1965	364	9.58	2.81	15.37	2.43	88.63
5	02083500	1966	356	10.64	2.77	14.89	2.27	91.50
5	02083500	1967	362	9.40	2.83	14.54	2.30	89.30
5	02129000	1961	364	8.05	2.59	15.06	2.29	86.35
5	02129000	1962	297	13.67	2.81	11.82	2.54	91.49
5	02129000	1963	358	11.30	2.64	16.73	1.28	97.50
5	02129000	1964	356	10.16	2.71	16.53	1.24	97.12
5	02129000	1965	316	9.49	2.64	17.59	1.26	96.84
5	02129000	1966	349	10.39	2.62	16.95	1.34	96.85
5	02129000	1967	301	10.10	2.68	16.92	1.63	94.85
5	02256500	1965	365	3.47	2.65	23.61	1.55	70.89
5	02256500	1966	365	5.40	2.76	23.30	1.56	83.71
5	02256500	1967	354	5.01	2.73	22.93	2.02	75.29
5	02256500	1968	364	5.09	2.69	23.00	1.91	78.09
5	02256500	1969	359	6.21	2.80	22.48	2.31	78.33
5	02256500	1970	332	6.63	2.80	23.18	2.15	80.95
5	02256500	1971	363	5.71	2.84	23.15	2.06	79.31
5	02273200	1965	322	5.27	2.91	24.43	1.94	78.89
5	02273200	1966	363	6.48	2.74	23.77	1.97	84.45
5	02273200	1967	365	6.78	2.85	24.01	1.79	87.37
5	02273200	1968	366	7.40	2.74	24.14	2.27	82.27
5	02273200	1969	365	8.73	2.88	24.11	1.87	91.25
5	02273200	1970	333	6.11	2.96	23.67	2.65	73.78
5	02277000	1965	364	4.85	2.75	24.23	1.25	88.37
5	02277000	1966	364	5.76	2.64	23.81	1.24	91.52
5	02277000	1967	365	5.04	2.76	23.71	1.34	87.35
5	02277000	1968	366	5.89	2.65	23.69	1.45	88.15
5	02277000	1969	360	6.48	2.71	23.48	1.34	92.11
5	02277000	1970	354	6.74	2.72	23.19	1.69	89.00
5	02277000	1971	364	5.19	2.66	23.52	1.28	89.18

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	02285000	1965	354	3.57	2.81	24.60	1.25	80.30
5	02285000	1966	354	4.30	2.68	24.36	1.55	79.01
5	02285000	1967	358	3.07	2.95	23.94	1.66	63.44
5	02285000	1968	360	4.90	2.80	23.40	2.10	73.43
5	02285000	1969	358	4.07	2.57	24.90	1.57	77.06
5	02285000	1970	351	4.62	2.69	24.22	2.12	70.33
5	02285000	1971	357	5.25	1.74	25.72	2.84	63.13
5	02296750	1967	355	5.40	2.94	24.70	2.00	78.31
5	02296750	1968	366	5.67	2.75	25.11	2.68	66.49
5	02296750	1969	362	6.93	2.55	22.39	4.03	59.51
5	02296750	1970	339	6.96	2.79	20.98	3.01	73.30
5	02296750	1971	352	5.55	2.87	23.81	2.30	74.41
5	02313000	1950	270	4.69	2.82	24.84	1.89	78.61
5	02313000	1951	362	7.50	2.88	23.56	2.22	65.16
5	02313000	1965	363	5.61	2.87	22.37	1.68	81.70
5	02313000	1966	362	6.17	2.73	21.46	1.78	85.75
5	02313000	1967	364	5.83	2.92	21.83	1.79	84.15
5	02313000	1968	361	6.49	2.78	21.62	2.21	81.00
5	02313000	1969	365	7.77	2.85	21.11	2.09	86.28
5	02313000	1970	363	8.13	2.81	21.26	1.88	90.29
5	02320500	1965	350	5.48	2.64	20.62	1.77	83.30
5	02320500	1966	363	6.27	2.56	20.69	1.84	85.36
5	02320500	1967	362	5.57	2.79	21.25	1.68	84.60
5	02320500	1968	362	6.04	2.86	22.56	1.54	88.59
5	02320500	1969	360	6.07	2.68	21.96	1.70	86.48
5	02320500	1970	362	6.93	2.71	20.93	1.55	90.90
5	02320500	1971	354	5.44	2.57	21.41	1.49	86.88
5	02321500	1960	349	7.21	2.77	19.46	1.92	87.02
5	02321500	1961	322	6.99	2.74	20.12	2.54	79.06
5	02321500	1962	301	6.43	2.81	20.73	2.40	79.93
5	02321500	1963	221	7.04	2.88	20.22	2.26	84.95
5	02321500	1965	352	6.08	2.81	20.71	2.13	80.23
5	02321500	1966	360	7.05	2.73	20.08	2.06	85.45
5	02321500	1967	356	6.88	2.96	20.51	2.24	82.61
5	02321500	1968	354	7.63	2.85	20.68	2.48	82.68
5	02321500	1969	344	8.21	2.86	20.71	2.35	85.94
5	02321500	1970	255	7.38	2.84	20.75	1.98	84.25
5	02321500	1971	349	7.49	2.79	20.31	2.11	86.21
5	02489500	1963	315	8.82	3.02	20.19	2.65	85.99
5	02489500	1964	268	10.46	2.84	20.47	3.00	86.94
5	02489500	1965	365	9.82	2.71	21.64	2.61	87.10
5	02489500	1966	365	10.02	2.73	20.78	1.79	93.70
5	02489500	1967	364	8.42	2.86	21.55	2.51	84.95
5	02489500	1969	356	9.93	2.76	19.86	2.24	90.67
5	03049655	1964	359	13.48	2.58	14.27	1.84	96.41
5	03049655	1965	360	13.38	2.57	14.30	1.77	96.61
5	03049655	1966	352	13.67	2.59	13.50	2.12	95.34
5	03049655	1967	353	11.53	2.60	13.04	2.11	93.66
5	03049655	1969	323	12.66	2.60	13.34	1.55	97.14
5	03049655	1970	330	13.13	2.61	12.88	1.51	97.41

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	03251500	1960	324	10.17	2.91	13.29	2.81	86.77
5	03251500	1961	278	12.64	2.86	10.57	2.79	88.72
5	03251500	1962	354	11.83	2.87	13.29	2.58	91.11
5	03251500	1963	288	11.72	2.80	13.35	2.01	93.40
5	03251500	1964	273	13.70	2.76	12.26	2.53	90.66
5	03251500	1965	321	12.30	2.87	12.63	2.33	92.77
5	03251500	1966	329	11.36	2.77	13.24	1.87	94.56
5	03251500	1967	335	10.53	2.80	12.94	2.05	92.81
5	03251500	1968	323	12.00	2.79	13.88	2.26	92.73
5	03251500	1969	350	12.95	2.79	14.62	1.89	95.75
5	03251500	1970	325	13.63	2.75	13.72	1.82	96.30
5	03251500	1971	351	10.94	2.77	13.78	2.04	93.42
5	03276600	1960	364	12.55	2.68	16.45	2.65	91.82
5	03276600	1961	347	12.27	2.63	15.53	2.44	92.67
5	03276600	1962	356	13.19	2.81	16.57	2.21	94.69
5	03276600	1963	330	12.59	2.76	16.19	2.11	94.59
5	03276600	1964	354	12.62	2.76	16.38	2.45	93.06
5	03276600	1965	364	12.09	2.73	16.13	2.44	92.51
5	03276600	1966	364	11.74	2.75	16.61	2.20	93.45
5	03276600	1967	364	10.95	2.65	14.92	3.08	86.39
5	03276600	1968	364	11.65	2.76	15.62	2.20	93.34
5	03276600	1969	327	11.94	2.79	16.21	2.20	93.75
5	03276600	1970	307	12.89	2.73	15.87	2.25	93.91
5	03276600	1971	349	12.57	2.72	16.25	2.36	93.28
5	03277200	1960	337	13.13	2.56	15.53	2.14	95.03
5	03277200	1961	293	12.04	2.58	14.59	2.06	93.30
5	03277200	1962	357	13.46	2.67	15.99	1.56	97.39
5	03277200	1963	355	13.45	2.65	15.25	1.35	98.02
5	03277200	1964	314	13.64	2.60	16.21	1.58	97.43
5	03277200	1965	344	12.26	2.60	16.12	1.37	97.51
5	03277200	1966	342	12.11	2.55	15.85	1.27	97.82
5	03277200	1967	299	11.26	2.60	15.27	1.55	96.38
5	03277200	1968	312	12.44	2.60	15.33	1.68	96.51
5	03277200	1969	322	12.83	2.60	16.03	1.17	98.41
5	03277200	1970	314	13.53	2.60	16.05	1.39	97.89
5	05054000	1960	362	12.29	2.75	10.97	2.63	91.66
5	05054000	1961	363	12.15	2.73	10.97	1.93	95.23
5	05054000	1962	365	12.17	2.74	10.38	2.28	93.00
5	05054000	1963	364	12.26	2.72	11.33	2.01	94.91
5	05054000	1964	366	12.68	2.72	11.01	2.42	92.59
5	05054000	1965	365	12.11	2.76	10.40	2.21	93.42
5	05054000	1966	364	12.28	2.72	10.91	2.20	93.96
5	05054000	1967	365	11.76	2.75	10.49	2.07	93.95
5	05054000	1968	366	11.97	2.76	10.74	1.85	95.13
5	05054000	1969	365	12.34	2.73	10.79	2.22	93.61
5	05054000	1970	365	13.03	2.73	10.73	2.58	92.47
5	05054000	1971	365	12.32	2.77	10.89	2.18	93.73

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	05082500	1960	362	11.27	2.70	11.22	2.52	90.99
5	05082500	1961	362	11.54	2.72	10.42	2.54	91.14
5	05082500	1962	330	10.90	2.70	10.19	2.53	90.90
5	05082500	1963	365	12.84	2.74	10.41	2.42	93.14
5	05082500	1964	364	11.36	2.68	10.56	2.55	90.91
5	05082500	1965	365	11.83	2.75	9.26	2.49	91.31
5	05082500	1966	362	12.24	2.70	9.66	2.58	91.85
5	05082500	1967	246	16.22	2.73	6.13	1.70	95.52
5	05082500	1968	366	11.33	2.76	9.63	2.08	92.99
5	05082500	1969	364	12.12	2.70	9.61	2.27	93.45
5	05082500	1970	365	12.63	2.73	9.25	2.93	89.95
5	05082500	1971	365	12.40	2.77	9.71	2.36	93.03
5	05124000	1960	165	15.80	2.74	7.50	2.93	87.60
5	05124000	1961	224	13.18	2.84	7.84	2.44	89.18
5	05124000	1962	228	14.50	2.81	7.14	2.62	88.29
5	05124000	1963	175	14.91	2.78	7.64	1.90	94.15
5	05124000	1964	185	13.32	2.79	7.68	3.09	74.49
5	05124000	1967	214	15.99	2.68	5.32	3.19	84.06
5	05124000	1968	188	14.75	2.82	6.17	2.71	81.58
5	06185500	1966	298	10.70	2.66	8.07	1.99	91.90
5	06185500	1967	238	11.30	2.69	6.42	1.70	91.46
5	06185500	1968	261	9.99	2.74	8.00	1.57	92.00
5	06185500	1969	244	9.74	2.68	8.28	1.77	87.72
5	06185500	1970	254	10.37	2.70	6.83	1.77	90.61
5	06214500	1964	261	9.23	2.72	8.01	2.10	85.03
5	06214500	1965	240	6.91	2.79	7.22	2.38	76.78
5	06214500	1966	267	9.87	2.71	8.30	2.16	86.45
5	06214500	1967	256	8.91	2.70	7.67	2.51	78.79
5	06214500	1968	214	7.76	2.63	10.92	2.18	81.94
5	06214500	1969	258	10.54	2.80	10.24	2.57	82.80
5	06214500	1970	312	10.06	2.81	9.29	2.51	87.08
5	06294700	1960	247	12.15	2.84	9.11	2.43	87.35
5	06294700	1961	284	12.19	2.90	9.47	2.47	89.78
5	06294700	1962	257	11.79	2.91	8.78	2.34	88.25
5	06294700	1963	290	11.38	2.62	9.08	2.10	91.64
5	06294700	1964	259	11.62	2.74	9.02	2.25	88.30
5	06294700	1965	237	11.08	2.66	7.30	3.13	80.06
5	06294700	1966	356	11.01	2.75	10.26	2.29	91.95
5	06294700	1967	356	8.23	2.64	9.15	2.78	81.43
5	06294700	1968	333	8.61	2.56	9.31	2.08	89.09
5	06294700	1969	288	8.40	2.66	9.46	2.05	85.34
5	06294700	1970	342	7.67	2.64	9.64	2.27	84.53

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	06308500	1960	222	10.59	2.93	6.62	2.53	77.08
5	06308500	1961	236	11.79	2.89	5.98	2.58	82.33
5	06308500	1962	215	12.62	2.93	6.73	2.32	83.17
5	06308500	1963	257	12.04	2.82	8.32	2.06	90.23
5	06308500	1964	237	12.50	2.84	7.60	2.38	85.96
5	06308500	1965	224	13.21	2.88	6.42	2.61	83.27
5	06308500	1966	238	12.20	2.78	7.41	2.39	84.90
5	06308500	1967	223	14.70	2.82	5.95	2.57	85.36
5	06308500	1968	251	11.77	2.78	7.70	2.42	86.08
5	06308500	1969	242	12.08	2.84	9.03	2.46	84.75
5	06308500	1970	227	13.84	2.87	7.00	2.41	86.91
5	06329500	1960	198	16.93	2.88	7.69	2.91	85.83
5	06329500	1961	210	15.27	2.85	8.69	2.18	92.09
5	06329500	1962	259	13.15	2.83	9.09	2.39	90.74
5	06329500	1963	288	13.29	2.75	10.59	1.68	95.87
5	06329500	1964	334	10.93	2.74	11.36	2.31	91.94
5	06329500	1965	314	12.85	2.77	9.77	2.77	89.93
5	06329500	1966	305	11.58	2.67	9.74	2.03	92.88
5	06329500	1967	277	11.70	2.72	8.45	2.45	89.85
5	06329500	1968	316	10.75	2.77	9.25	2.01	92.60
5	06329500	1969	248	12.60	2.84	9.75	2.59	85.56
5	06329500	1970	235	14.92	2.76	6.99	2.22	91.01
5	06478500	1960	283	15.81	2.78	10.93	2.38	94.29
5	06478500	1961	304	14.65	2.84	11.79	1.61	97.13
5	06478500	1962	279	14.73	2.75	10.55	2.50	92.82
5	06478500	1963	302	14.49	2.82	13.81	2.42	93.62
5	06478500	1964	346	14.44	2.69	12.38	2.38	94.70
5	06478500	1965	347	11.78	2.71	9.92	1.83	95.19
5	06478500	1966	336	12.11	2.62	11.36	2.25	93.81
5	06478500	1967	309	13.72	2.73	10.58	1.90	96.03
5	06478500	1968	295	14.01	2.81	11.64	1.85	95.93
5	06478500	1969	283	14.28	2.72	11.46	2.39	93.06
5	06807000	1952	177	15.01	2.74	11.71	2.34	86.48
5	06807000	1953	294	13.39	2.74	11.78	2.26	93.44
5	06807000	1954	307	13.00	2.69	12.52	2.37	92.97
5	06807000	1955	296	12.86	2.75	12.12	2.30	92.27
5	06807000	1956	269	15.24	2.77	10.05	1.62	96.36
5	06807000	1957	337	13.17	2.66	10.86	2.05	95.01
5	06807000	1958	323	13.34	2.72	10.52	1.75	96.19
5	06807000	1959	330	13.73	2.68	11.84	1.58	97.12
5	06807000	1960	331	13.84	2.74	11.00	2.42	93.76
5	06807000	1961	356	12.91	2.74	12.00	1.83	96.06
5	06807000	1962	282	14.39	2.75	11.15	2.07	94.18
5	06807000	1963	298	13.42	2.76	12.74	2.18	93.45
5	06807000	1964	317	13.03	2.71	12.48	2.31	93.25
5	06807000	1965	290	14.10	2.77	11.18	2.29	93.20
5	06807000	1966	324	12.82	2.72	12.13	2.04	94.83
5	06807000	1967	320	12.44	2.76	11.67	2.12	93.72
5	06807000	1968	306	12.60	2.79	11.54	1.82	94.95
5	06807000	1969	313	13.35	2.70	11.21	1.78	96.03
5	06807000	1970	325	13.85	2.79	11.63	1.98	95.60
5	06807000	1971	310	13.54	2.74	11.06	1.79	95.85

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	06877600	1960	322	11.59	2.73	13.02	1.89	94.71
5	06877600	1961	313	10.80	2.72	12.57	2.13	91.87
5	06877600	1962	345	11.95	2.85	13.16	2.21	93.67
5	06877600	1963	338	12.65	2.78	13.16	2.29	93.56
5	06877600	1964	342	11.41	2.76	14.07	2.46	91.38
5	06877600	1965	333	11.22	2.73	14.22	2.92	87.37
5	06877600	1966	359	11.02	2.77	14.21	2.49	90.66
5	06877600	1967	364	10.32	2.91	13.65	2.57	88.97
5	06877600	1968	359	12.17	2.75	13.67	2.19	93.82
5	06877600	1969	311	12.60	2.72	13.04	1.89	95.56
5	06877600	1970	347	13.46	2.92	15.17	2.91	91.09
5	06892500	1962	299	14.04	2.84	14.44	2.31	94.38
5	06892500	1963	340	14.23	2.83	15.93	2.56	93.47
5	07146500	1960	335	12.07	2.81	15.35	3.39	87.63
5	07146500	1961	350	11.64	2.82	16.05	3.25	86.51
5	07146500	1962	333	12.85	2.95	16.75	3.10	89.08
5	07146500	1963	349	11.16	2.62	16.09	5.12	69.95
5	07146500	1964	339	13.16	2.84	18.33	3.53	87.22
5	07146500	1965	354	12.14	2.85	17.26	3.32	86.89
5	07146500	1966	352	12.62	2.83	18.42	3.11	89.01
5	07146500	1967	357	10.63	2.94	17.29	3.98	77.97
5	07146500	1968	352	12.25	2.90	17.31	3.56	85.38
5	07146500	1969	336	13.17	2.82	16.42	3.14	89.48
5	07146500	1970	284	10.06	2.95	15.72	3.68	78.59
5	07161000	1960	347	11.86	2.79	14.86	3.76	82.92
5	07161000	1961	349	10.77	2.79	15.09	2.74	88.36
5	07161000	1962	357	11.95	2.79	15.15	2.68	90.84
5	07161000	1963	354	11.66	2.86	16.07	2.84	89.32
5	07161000	1966	361	9.76	2.68	14.60	2.91	84.80
5	07161000	1967	364	8.82	2.87	14.06	3.49	76.15
5	07161000	1968	365	9.61	2.77	14.01	2.97	84.04
5	07161000	1969	162	9.80	2.77	12.51	2.97	61.40
5	07161000	1970	306	11.55	2.91	13.96	2.76	89.60
5	07164400	1960	314	11.15	2.79	16.28	4.78	73.30
5	07164400	1961	360	11.55	2.78	15.71	3.07	87.53
5	07164400	1962	338	12.60	2.83	16.06	2.63	91.61
5	07164400	1963	327	13.23	2.89	17.27	2.97	90.52
5	07164400	1964	342	12.26	2.81	16.93	3.26	87.03
5	07164400	1965	363	12.48	2.68	16.14	2.54	92.36
5	07164400	1966	364	9.73	2.61	17.13	2.52	86.36
5	07164400	1967	352	9.52	2.63	16.34	2.14	90.76
5	07164400	1968	362	11.23	2.64	15.98	2.04	93.80
5	07164400	1969	178	12.48	2.68	16.37	1.72	90.32
5	07164400	1970	300	11.36	2.68	15.64	2.09	92.89

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	07178600	1960	275	12.82	2.65	15.20	2.72	91.51
5	07178600	1961	348	10.21	2.73	16.83	2.54	88.76
5	07178600	1962	346	12.62	2.79	17.72	2.44	92.82
5	07178600	1963	339	14.13	2.79	18.57	2.34	94.73
5	07178600	1964	350	11.23	2.79	19.49	2.85	88.52
5	07178600	1965	353	11.88	2.79	17.60	2.08	94.28
5	07178600	1968	352	12.11	2.54	16.57	1.84	95.49
5	07178600	1969	356	12.32	2.72	16.88	1.81	95.87
5	07178600	1970	268	10.57	2.79	16.14	2.76	84.11
5	07193500	1960	365	11.67	2.56	15.41	1.86	95.18
5	07193500	1961	355	10.63	2.57	15.74	1.65	95.46
5	07193500	1962	354	11.65	2.58	15.73	1.52	96.73
5	07193500	1963	346	11.53	2.59	16.13	1.83	95.11
5	07245000	1960	362	11.35	2.78	15.03	2.89	88.63
5	07245000	1961	361	10.33	2.80	15.56	2.76	87.47
5	07245000	1962	361	11.26	2.84	15.70	2.52	90.82
5	07245000	1963	344	11.17	2.83	16.21	2.63	89.59
5	07245000	1964	315	10.51	2.81	15.83	2.66	88.77
5	07245000	1967	316	7.75	2.79	14.98	2.62	82.83
5	07245000	1968	354	9.07	2.62	14.44	1.90	91.91
5	07245000	1969	351	9.49	2.59	14.49	1.57	94.80
5	07245000	1970	264	9.71	2.65	14.50	1.96	89.03
4	07263500	1946	364	11.78	2.86	17.78	2.58	91.23
4	07263500	1947	362	12.76	2.67	17.75	1.99	95.36
4	07263500	1948	364	12.62	2.78	18.14	2.49	92.82
4	07263500	1949	365	11.98	2.81	18.23	1.61	96.32
4	07263500	1950	358	10.22	2.80	18.12	1.68	94.83
4	07263500	1951	353	12.02	2.75	18.17	2.36	92.90
4	07263500	1952	359	11.84	2.82	18.53	2.40	92.43
4	07263500	1953	360	11.65	2.87	18.52	2.30	92.76
4	07263500	1954	362	12.50	2.82	19.28	2.39	93.18
4	07263500	1955	359	11.70	2.81	18.94	2.56	91.32
4	07263500	1956	343	12.52	2.84	18.66	2.36	93.56
4	07263500	1957	362	10.78	2.72	18.06	2.00	93.59
4	07263500	1958	357	12.20	2.71	17.38	1.91	95.29
4	07263500	1959	364	12.58	2.79	18.09	2.19	94.32
4	07263500	1960	361	13.43	2.64	16.32	2.83	91.83
4	07263500	1961	183	14.29	2.74	17.61	2.13	92.55
4	07263500	1962	349	12.88	2.83	18.25	2.18	94.63
4	07263500	1963	339	12.92	2.85	18.38	2.44	93.54
4	07263500	1964	357	12.62	2.78	18.37	2.60	92.17
4	07263500	1965	353	11.92	2.75	18.04	2.14	93.93
4	07263500	1966	348	10.65	2.67	18.11	1.77	94.70
4	07263500	1967	357	10.54	2.86	17.54	2.67	88.65
3	07263500	1968	351	11.49	2.73	16.61	1.74	95.59
3	07263500	1969	350	12.04	2.75	16.81	1.55	96.81

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	07331000	1960	361	11.98	2.78	19.53	3.26	87.17
5	07331000	1961	359	10.31	2.76	20.54	3.07	84.99
5	07331000	1962	356	11.23	2.83	19.28	3.15	86.31
5	07331000	1963	347	11.76	2.85	20.16	2.88	89.25
5	07331000	1964	349	11.88	2.82	20.95	2.61	91.08
5	07331000	1965	364	9.40	2.79	21.42	3.02	82.93
5	07331000	1966	353	9.43	2.78	21.15	3.13	81.95
5	07331000	1967	359	9.14	2.84	20.11	3.02	82.14
5	07331000	1968	338	10.76	2.76	19.33	2.87	87.61
5	07331000	1969	171	9.82	2.77	18.53	2.71	66.01
5	07331000	1970	232	10.73	2.84	20.20	3.28	72.08
5	07331600	1960	245	8.80	2.36	16.19	1.49	94.67
5	07331600	1961	243	7.71	2.39	16.59	1.53	92.75
5	07331600	1962	214	8.84	2.59	17.41	1.50	94.65
5	07331600	1963	230	10.19	2.41	17.02	1.43	96.25
5	07331600	1964	245	9.85	2.40	17.71	1.37	96.32
5	07331600	1965	239	8.22	2.18	15.36	1.47	94.07
5	07331600	1967	250	9.92	2.57	17.74	0.98	98.07
5	07331600	1968	228	10.50	2.45	17.43	0.99	98.35
5	07331600	1969	245	10.84	2.48	17.66	0.73	99.08
5	07331600	1971	215	9.72	2.42	16.78	0.94	98.13
5	07344400	1960	349	11.51	2.71	18.59	2.39	92.22
5	07344400	1961	359	10.08	2.74	18.73	2.47	89.36
5	07344400	1962	359	11.35	2.79	18.99	2.13	93.43
5	07344400	1963	359	12.29	2.83	19.35	2.39	92.99
5	07344400	1964	359	12.31	2.83	19.49	2.25	93.83
5	07344400	1965	365	12.21	2.76	19.70	2.53	91.39
5	07344400	1966	365	10.35	2.71	18.16	2.25	90.60
5	07344400	1967	365	11.08	3.02	17.25	2.51	90.67
5	07367000	1968 MX	130	10.81	2.84	22.17	4.62	73.79
5	07367000	1969 MX	296	10.45	2.57	21.30	2.97	84.72
5	07367000	1970 MX	300	13.51	2.65	20.20	3.01	90.48
5	07367000	1971 MX	342	11.37	2.79	21.10	2.20	93.33
5	07367000	1968	130	10.81	2.84	19.00	4.62	73.79
5	07367000	1969	296	11.03	2.64	20.17	2.20	91.87
5	07367000	1970	300	13.58	2.65	19.75	3.02	90.52
5	07367000	1971	342	11.41	2.79	20.70	2.18	93.50
5	07367000	1972	361	11.41	2.67	22.39	2.02	94.08
5	08030500	1960	359	9.52	2.73	21.28	2.27	89.94
5	08030500	1961	353	9.05	2.79	20.26	2.31	88.41
5	08030500	1962	329	7.90	2.72	20.21	3.63	71.44
5	08030500	1963	351	9.31	2.79	23.09	2.12	90.57
5	08030500	1964	277	10.56	2.72	21.92	2.05	92.74
5	08030500	1965	269	9.43	2.76	21.72	2.17	90.02
5	08030500	1966	244	9.49	2.70	21.41	2.22	90.41
5	08030500	1967	293	8.54	2.80	21.47	2.30	87.02
5	08030500	1968	304	7.85	2.72	19.74	2.48	83.36
5	08030500	1969	340	9.24	2.62	19.82	2.04	91.10
5	08030500	1970	316	9.79	2.68	20.56	1.91	92.78

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	08041000	1960	366	12.29	2.69	20.26	2.01	94.46
5	08041000	1961	338	9.07	2.77	20.08	2.30	87.87
5	08041000	1962	340	9.90	2.70	21.01	1.88	92.99
5	08041000	1963	351	12.12	2.81	20.72	2.10	94.29
5	08041000	1964	353	10.94	2.78	20.02	2.29	91.92
5	08041000	1965	360	9.41	2.78	21.00	2.25	89.90
5	08041000	1967	364	8.86	2.87	21.05	2.34	87.82
5	08041000	1968	351	8.54	2.72	19.45	2.43	86.34
5	08041000	1969	363	9.23	2.69	19.85	2.06	91.02
5	08041000	1970	358	9.43	2.83	20.43	1.94	92.22
5	08041000	1971	355	8.99	2.89	20.70	2.10	90.28
5	08065350	1964	235	11.41	2.65	22.37	2.35	91.80
5	08065350	1965	363	9.84	2.73	20.43	2.17	91.09
5	08065350	1966	364	9.57	2.66	20.28	2.02	91.84
5	08065350	1967	362	9.02	2.88	20.51	2.06	90.54
5	08065350	1968	363	10.00	2.71	18.88	1.80	93.90
5	08065350	1969	363	10.19	2.69	20.08	1.70	94.75
5	08065350	1970	365	10.74	2.71	19.67	1.67	95.28
5	08065350	1971	365	8.81	2.83	20.75	1.88	91.30
5	08068000	1962	331	6.85	3.02	21.83	2.94	71.97
5	08068000	1963	345	8.23	2.98	21.42	3.09	77.92
5	08068000	1964	359	10.15	2.83	22.21	3.03	84.91
5	08068000	1965	341	8.66	2.83	22.88	2.79	83.55
5	08068000	1966	342	9.08	2.75	21.84	2.68	85.44
5	08068000	1967	358	7.62	2.94	22.41	3.09	75.32
5	08068000	1968	347	8.93	2.77	21.73	2.53	85.97
5	08068000	1969	354	9.21	2.78	21.98	2.50	87.06
5	08068000	1970	360	9.93	2.80	22.98	2.74	86.68
5	08068000	1971	352	7.45	2.86	23.14	2.95	76.18
5	08082500	1960	280	10.67	3.02	18.85	4.10	77.20
5	08082500	1961	255	9.51	2.88	19.46	3.94	73.96
5	08082500	1962	244	10.05	2.63	17.76	3.81	74.26
5	08082500	1963	289	12.16	2.93	19.54	4.41	79.13
5	08082500	1964	240	12.50	2.92	21.31	3.93	80.13
5	08082500	1965	236	10.46	2.92	19.92	4.04	76.14
5	08082500	1966	223	9.78	2.88	19.72	4.25	65.65
5	08082500	1967	309	9.42	2.77	20.92	4.05	70.74
5	08082500	1968	230	9.15	2.86	18.24	4.25	58.25
5	08082500	1969	339	8.57	3.01	19.96	3.61	73.21
5	08082500	1970	303	8.10	3.02	19.63	3.69	69.71
5	08082500	1971	358	6.67	3.56	22.42	4.33	53.83

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	08123800	1960	240	9.64	3.02	18.31	4.71	65.26
5	08123800	1961	229	11.10	2.88	18.22	4.13	81.98
5	08123800	1962	253	10.90	2.88	19.18	4.39	71.83
5	08123800	1963	274	10.74	2.90	20.22	4.21	73.92
5	08123800	1964	221	10.57	2.93	18.13	3.35	80.82
5	08123800	1965	264	9.68	2.83	18.59	4.19	74.22
5	08123800	1966	334	9.56	2.79	18.13	3.56	77.09
5	08123800	1967	320	9.12	2.92	18.21	3.59	75.42
5	08123800	1968	324	10.06	2.87	17.33	3.47	80.19
5	08123800	1969	300	10.04	2.82	17.62	3.31	81.76
5	08123800	1970	292	10.22	2.85	16.89	3.74	74.95
5	08123800	1971	336	9.10	2.88	17.39	3.88	73.02
5	08126500	1962	230	9.80	2.91	18.87	2.80	86.32
5	08126500	1963	298	11.38	2.86	20.03	2.89	88.61
5	08126500	1964	294	10.97	2.90	19.64	2.69	88.18
5	08126500	1965	340	10.20	2.80	18.94	2.66	88.40
5	08126500	1966	326	9.99	2.84	19.15	2.88	84.56
5	08126500	1967	322	10.30	2.93	19.35	2.74	87.66
5	08126500	1968	346	10.98	2.87	18.66	2.61	89.64
5	08126500	1969	343	11.13	2.82	19.88	2.42	91.52
5	08126500	1970	349	10.85	2.89	19.47	2.66	89.30
5	08126500	1971	296	9.51	2.89	19.35	2.81	84.66
5	08158000	1958	336	6.40	2.29	18.77	1.09	94.56
5	08158000	1960	354	6.47	2.26	18.51	1.10	94.49
5	08158000	1961	321	6.37	2.39	19.61	1.33	92.33
5	08158000	1962	344	5.04	2.55	20.26	2.09	74.26
5	08158000	1963	347	6.19	2.52	20.22	2.42	76.97
5	08158000	1964	359	6.73	2.43	22.29	1.65	89.31
5	08158000	1965	352	5.15	2.26	21.18	1.72	81.54
5	08158000	1967	362	4.64	2.57	20.25	1.72	78.48
5	08158000	1968	357	7.03	2.34	18.82	1.43	92.38
5	08158000	1969	323	4.37	2.38	20.98	2.05	69.87
5	08158000	1970	309	5.87	2.20	19.15	1.65	86.59
5	08158000	1971	306	4.71	2.43	20.31	1.29	86.79
5	08162000	1960	353	9.72	2.75	20.63	2.19	90.57
5	08162000	1961	363	8.75	2.79	20.78	2.37	87.24
5	08162000	1962	363	9.02	2.82	21.40	2.50	86.69
5	08162000	1963	361	9.77	2.84	21.06	2.72	86.62
5	08162000	1964	360	9.90	2.82	20.48	2.75	86.63
5	08162000	1965	356	8.24	2.81	20.96	2.85	80.41
5	08162000	1967	352	8.30	2.93	21.12	3.00	79.19
5	08162000	1968	347	7.80	2.60	19.42	2.61	81.59
5	08162000	1969	352	9.08	2.76	21.09	2.29	88.80
5	08162000	1970	344	9.51	2.66	20.89	2.18	90.46
5	08162000	1971	350	7.80	2.86	21.30	2.74	80.20

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	08164500	1960	341	9.01	2.86	21.67	3.00	82.87
5	08164500	1961	352	8.02	2.86	22.07	2.96	79.23
5	08164500	1962	341	8.28	2.84	23.66	2.97	79.49
5	08164500	1963	346	8.27	2.60	21.37	3.56	72.38
5	08164500	1964	342	8.84	2.84	20.34	2.72	84.34
5	08164500	1965	332	8.31	2.86	20.37	2.97	81.03
5	08164500	1966	365	8.51	2.77	20.07	2.51	83.99
5	08164500	1967	360	7.37	2.85	21.06	3.03	74.69
5	08164500	1968	356	7.74	2.75	20.06	2.56	82.07
5	08164500	1969	342	8.02	2.79	19.96	2.64	81.88
5	08164500	1970	322	8.68	2.73	19.15	3.21	78.14
5	08164500	1971	305	6.70	2.76	20.24	3.13	70.29
5	08176500	1960	318	8.97	2.80	20.12	1.94	92.19
5	08176500	1961	342	7.95	2.84	20.58	1.86	90.19
5	08176500	1962	342	8.65	2.81	21.13	2.16	88.99
5	08176500	1963	362	9.87	2.87	20.91	2.47	88.81
5	08176500	1964	365	9.83	2.80	20.83	2.20	90.91
5	08176500	1965	361	8.21	2.75	21.07	2.34	86.06
5	08176500	1967	363	8.11	2.94	21.61	2.33	85.85
5	08176500	1968	360	8.17	2.75	20.69	1.94	89.87
5	08176500	1969	355	8.53	2.73	21.36	2.04	89.85
5	08176500	1970	354	8.53	2.71	21.03	1.87	91.21
5	08176500	1971	353	7.11	2.91	21.85	1.87	87.88
5	08188500	1960	361	8.69	2.80	21.13	2.25	88.31
5	08188500	1961	365	7.96	2.84	21.66	2.31	85.05
5	08188500	1962	365	8.75	2.85	21.73	2.40	86.50
5	08188500	1963	364	8.72	2.93	21.28	2.62	84.74
5	08188500	1964	356	9.50	3.02	20.35	2.64	87.02
5	08188500	1965	365	8.14	2.83	21.68	2.27	85.20
5	08188500	1966	365	8.37	2.80	21.47	2.21	86.60
5	08188500	1967	363	7.78	2.99	21.19	2.61	81.69
5	08188500	1968	366	8.92	2.81	21.44	1.96	90.18
5	08188500	1969	363	7.74	2.81	22.27	2.00	88.23
5	08188500	1970	365	8.28	2.81	21.39	2.21	87.07
5	08188500	1971	364	7.27	2.92	22.14	2.34	82.87
5	08189500	1963	301	8.53	2.92	23.75	3.07	81.14
5	08189500	1964	364	9.38	2.91	24.44	2.66	85.85
5	08189500	1965	351	8.35	2.68	25.65	2.98	79.70
5	08189500	1966	321	8.28	2.22	22.85	2.89	80.34
5	08189500	1967	347	6.91	3.07	25.55	2.71	76.85
5	08189500	1968	206	7.52	2.76	23.83	2.88	76.02
5	08189500	1969	320	7.83	2.80	23.56	2.34	83.98
5	08189500	1970	276	7.37	2.78	22.62	2.28	80.56
5	08189500	1971	324	6.56	2.97	23.47	2.82	73.39

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	08211000	1960	314	8.71	2.67	21.82	1.90	90.98
5	08211000	1961	357	8.44	2.71	22.30	1.86	91.27
5	08211000	1962	333	8.43	2.76	22.39	1.84	91.44
5	08211000	1963	355	9.23	2.74	23.42	2.15	90.13
5	08211000	1964	339	9.80	2.69	24.34	1.95	92.76
5	08211000	1966	362	7.91	2.61	25.25	1.65	92.00
5	08211000	1967	351	5.98	2.83	24.16	2.25	78.22
5	08211000	1968	349	8.74	2.68	15.76	2.31	87.84
5	08211000	1969	351	10.02	2.88	19.18	1.97	92.84
5	08211000	1970	348	8.33	2.61	19.51	1.58	93.20
5	08211000	1971	298	6.32	2.79	20.69	1.67	93.01
5	08313000	1962	344	10.69	2.84	13.80	2.09	92.58
5	08313000	1963	335	10.95	2.81	15.21	1.76	94.68
5	08313000	1964	362	11.37	2.75	14.17	1.88	94.77
5	08313000	1965	360	9.65	2.77	13.50	2.25	90.23
5	08313000	1966	329	10.86	2.79	15.01	1.77	94.43
5	08313000	1967	354	10.43	2.86	14.88	2.11	92.43
5	08313000	1968	362	9.88	2.82	14.00	2.18	91.10
5	08313000	1970	360	10.24	2.86	13.89	2.44	89.77
5	08358300	1960	283	10.80	2.84	15.51	3.24	85.09
5	08358300	1961	278	8.05	2.91	15.83	3.26	74.98
5	08358300	1962	294	10.09	2.88	14.64	3.11	84.20
5	08358300	1963	275	10.70	2.82	15.88	2.99	85.36
5	08358300	1964	271	11.90	2.83	15.20	3.01	88.43
5	08358300	1965	315	9.59	2.83	13.88	2.61	87.60
5	08358300	1966	352	10.11	2.83	13.78	2.01	92.55
5	08358300	1967	340	8.92	2.91	12.69	2.93	81.44
5	08358300	1968	325	8.41	2.96	13.27	2.52	85.19
5	08358300	1969	330	9.84	2.87	13.85	2.18	91.76
5	08358300	1970	316	9.04	2.80	14.39	2.41	87.45
5	08407500	1960	350	10.53	2.92	20.87	2.15	92.39
5	08407500	1961	363	10.65	2.84	19.47	2.17	92.37
5	08407500	1962	364	11.32	2.91	19.03	2.45	91.44
5	08407500	1963	351	10.87	2.91	20.21	2.65	89.18
5	08407500	1964	355	11.62	2.87	19.57	2.30	92.81
5	08407500	1965	356	10.62	2.90	20.02	2.20	92.17
5	08407500	1966	354	10.33	2.86	20.34	2.53	89.41
5	08407500	1967	350	10.31	3.00	20.20	2.29	91.07
5	08407500	1968	360	10.99	2.91	19.33	2.44	91.08
5	08407500	1969	361	11.04	2.89	20.35	2.38	91.54
5	08407500	1970	359	11.55	2.90	20.17	2.22	93.07

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	09152500	1959	349	11.59	2.81	13.75	2.38	92.24
5	09152500	1960	292	10.49	2.77	10.39	2.03	91.52
5	09152500	1961	254	10.64	2.77	10.09	2.17	88.43
5	09152500	1962	264	9.89	2.72	9.16	2.11	87.91
5	09152500	1963	283	10.22	2.74	10.83	1.64	94.54
5	09152500	1964	281	9.76	2.61	10.19	1.75	92.40
5	09152500	1965	298	8.23	2.68	9.17	2.01	87.04
5	09152500	1966	289	9.95	2.75	10.77	1.82	91.46
5	09152500	1967	318	9.41	2.72	10.82	2.05	90.25
5	09152500	1968	348	7.75	2.74	9.99	2.09	86.82
5	09152500	1970	354	8.06	2.73	9.74	2.04	88.35
5	09152500	1972	366	9.81	2.86	11.61	1.71	93.81
5	09180500	1950	246	10.15	2.75	11.40	2.10	91.27
5	09180500	1951	278	9.61	2.77	11.72	2.12	90.51
5	09180500	1952	220	10.33	2.71	10.73	1.97	92.27
5	09180500	1953	153	11.76	2.70	12.18	2.12	91.91
5	09180500	1954	243	10.40	2.80	12.75	1.79	92.88
5	09180500	1955	225	11.67	2.68	10.77	1.98	89.86
5	09180500	1956	249	10.21	2.78	11.19	2.06	90.84
5	09180500	1957	220	9.19	2.67	10.26	2.62	78.65
5	09180500	1959	209	11.32	2.81	11.65	1.85	93.03
5	09180500	1965	216	9.09	2.77	10.65	2.45	85.07
5	09180500	1966	216	12.00	2.79	12.79	2.20	93.03
5	09180500	1967	217	10.79	2.73	12.88	2.74	87.46
5	09180500	1970	275	9.25	2.77	10.90	2.64	85.22
5	09180500	1972	265	9.87	2.89	12.36	2.33	89.69
5	09234500	1959	313	10.68	2.77	9.54	1.94	93.97
5	09234500	1962	187	10.46	2.81	7.80	2.14	90.10
5	09234500	1964	352	2.75	1.55	6.50	1.66	57.34
5	09234500	1965	327	4.06	1.77	7.59	0.97	89.94
5	09234500	1967	359	2.16	1.48	6.04	0.60	86.65
5	09234500	1970	274	2.85	1.26	6.43	0.82	86.30
5	09251000	1959	282	9.92	2.71	10.49	2.49	87.12
5	09251000	1960	281	11.19	2.73	9.66	2.97	86.06
5	09251000	1961	238	11.26	2.70	10.45	2.70	87.80
5	09251000	1962	293	11.10	2.71	9.43	2.44	89.89
5	09251000	1963	361	11.00	2.73	10.93	2.37	91.51
5	09251000	1964	357	9.76	2.44	8.86	2.49	88.65
5	09251000	1965	281	9.36	2.45	8.59	2.57	84.94
5	09251000	1966	301	8.26	2.50	9.10	3.53	69.61
5	09251000	1967	338	9.99	2.56	10.03	2.98	84.48
5	09251000	1969	349	12.00	2.66	10.35	3.00	89.17
5	09251000	1970	364	10.90	2.54	10.11	2.74	88.87

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	09306500	1959	300	10.46	2.87	10.93	2.36	90.85
5	09306500	1960	316	10.36	2.79	9.58	2.19	91.37
5	09306500	1961	247	12.21	2.87	9.96	2.30	90.13
5	09306500	1962	231	10.83	2.81	9.03	2.33	87.07
5	09306500	1963	259	12.24	2.81	10.01	2.01	92.66
5	09306500	1964	215	12.76	2.65	8.93	2.27	88.37
5	09306500	1965	166	11.24	2.68	8.09	2.37	82.90
5	09306500	1966	225	11.13	2.82	9.94	1.89	93.55
5	09306500	1967	248	10.76	2.72	8.70	2.31	87.53
5	09306500	1968	237	10.53	2.79	8.11	2.07	86.71
5	09306500	1969	267	10.98	2.78	9.10	2.13	89.45
5	09306500	1970	285	7.02	2.75	6.76	2.23	78.89
5	09306500	1972	299	10.31	2.86	9.12	1.97	92.92
5	09315000	1950	321	11.19	2.74	11.73	1.86	94.59
5	09315000	1951	304	11.50	2.80	12.48	2.04	94.16
5	09315000	1952	288	12.48	2.73	11.49	1.95	95.20
5	09315000	1953	299	11.65	2.73	12.29	2.18	93.46
5	09315000	1954	299	11.62	2.85	13.00	2.15	93.79
5	09315000	1955	277	13.21	2.66	11.53	1.63	96.24
5	09315000	1956	331	11.75	2.79	12.24	1.80	95.52
5	09315000	1957	291	11.30	2.79	11.49	2.42	90.96
5	09315000	1959	218	10.61	2.78	14.29	1.86	92.59
5	09315000	1965	164	12.43	2.77	10.49	2.14	91.45
5	09315000	1966	176	12.11	2.85	13.15	1.70	95.29
5	09315000	1967	270	11.01	2.74	10.65	1.92	93.13
5	09315000	1970	277	10.69	2.87	10.53	1.78	94.65
5	09315000	1972	277	10.60	2.92	12.23	1.95	93.57
5	09368000	1959	332	11.15	2.88	13.13	3.10	86.27
5	09368000	1960	307	10.76	2.76	12.78	2.69	88.44
5	09368000	1961	333	11.55	2.88	14.10	2.75	89.94
5	09368000	1962	357	11.66	2.73	13.13	2.63	90.73
5	09368000	1963	357	12.01	2.79	14.97	2.19	93.65
5	09368000	1964	362	11.21	2.73	13.95	2.30	92.31
5	09368000	1965	364	8.81	2.76	12.91	2.88	82.43
5	09368000	1966	333	9.85	2.78	13.84	2.37	89.81
5	09366000	1967	363	9.19	2.91	14.43	2.77	84.68
5	09366000	1968	338	9.95	3.02	13.60	3.35	80.98
5	09368000	1969	354	8.68	2.73	11.73	2.62	84.35
5	09368000	1970	358	8.36	2.90	12.58	3.14	77.66
5	09379500	1960	317	10.97	2.82	12.37	2.13	92.61
5	09379500	1961	319	11.00	2.87	12.28	2.02	92.96
5	09379500	1965	295	9.92	2.82	13.30	2.45	90.13
5	09379500	1966	361	11.88	2.80	14.54	1.83	95.48
5	09379500	1967	362	11.26	2.86	13.90	2.03	93.89
5	09379500	1970	341	11.09	2.65	13.37	2.39	91.41
5	09379500	1972	293	12.10	2.93	14.39	2.38	92.47

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	09380000	1959	308	11.66	2.85	14.56	1.95	94.80
5	09380000	1960	272	11.50	2.81	14.45	3.75	82.36
5	09380000	1961	274	11.79	2.86	14.57	1.64	95.86
5	09380000	1962	255	11.38	2.77	13.52	2.14	92.92
5	09380000	1963	243	7.84	2.57	11.70	2.24	85.80
5	09380000	1964	210	5.60	1.83	12.50	2.47	75.22
5	09380000	1965	190	5.82	1.93	14.69	1.49	87.07
5	09380000	1966	217	4.55	1.85	14.51	0.98	91.58
5	09380000	1967	331	6.88	2.19	12.72	1.06	95.59
5	09380000	1969	257	5.13	1.95	12.56	1.29	88.77
5	09380000	1970	315	4.64	2.18	11.62	1.57	81.38
5	09502000	1959	209	4.05	1.79	18.19	0.89	92.30
5	09502000	1960	209	4.74	1.89	15.79	0.85	93.41
5	09502000	1961	258	4.29	2.15	16.24	0.55	97.08
5	09502000	1962	232	3.78	1.91	16.06	0.57	95.53
5	09502000	1963	205	3.19	1.90	16.85	1.14	80.09
5	09502000	1964	226	4.31	1.99	15.53	0.43	98.27
5	09502000	1965	197	4.38	1.63	16.20	1.00	87.39
5	09502000	1966	228	4.01	1.84	15.79	0.80	92.77
5	09502000	1967	291	4.09	1.97	15.90	1.37	81.10
5	09502000	1969	331	4.94	2.30	15.75	1.08	91.23
5	09502000	1970	346	3.84	2.29	15.68	0.78	92.23
5	09510000	1959	362	7.25	2.18	16.87	1.66	90.52
5	09510000	1960	362	9.46	2.24	17.14	1.35	96.10
5	09510000	1961	337	8.71	2.27	17.26	2.27	88.03
5	09510000	1962	322	8.55	2.25	17.14	2.07	90.07
5	09510000	1963	360	7.70	2.18	17.56	2.49	82.71
5	09510000	1964	357	8.13	2.02	17.26	2.28	86.58
5	09510000	1965	280	7.91	2.18	16.09	2.36	84.50
5	09510000	1969	321	7.68	2.11	16.63	2.64	81.75
5	09510000	1970	353	2.85	1.75	14.74	2.38	41.54
5	11152500	1967	109	6.53	2.73	17.46	1.98	86.22
5	11152500	1970	271	4.84	3.09	17.22	2.30	67.22
5	11152500	1971	211	5.90	2.75	17.96	2.37	76.61
5	11303500	1960	356	6.83	2.93	16.09	1.89	86.93
5	11303500	1961	354	6.63	2.88	15.50	1.76	87.57
5	11303500	1962	332	7.20	2.80	16.15	1.20	95.14
5	11303500	1963	360	6.29	2.52	16.13	1.26	92.54
5	11477000	1959	200	6.21	2.70	15.50	1.40	86.87
5	11477000	1960	263	6.22	2.71	14.75	1.79	86.21
5	11477000	1963	345	6.43	2.57	14.41	1.50	90.10
5	11477000	1964	342	6.62	2.69	13.49	1.14	94.94
5	11477000	1966	333	7.23	2.70	14.55	1.32	94.26
5	11477000	1967	365	7.91	2.38	14.63	1.58	92.32
5	11477000	1968	366	7.66	2.70	15.41	1.60	91.58
5	11477000	1969	326	5.73	2.56	14.54	1.06	93.62
5	11477000	1970	348	6.23	2.78	15.56	1.42	91.05

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	11530500	1966	207	6.93	2.47	13.36	1.05	88.19
5	11530500	1967	365	7.90	2.33	13.44	1.47	93.17
5	11530500	1968	366	9.35	2.70	14.68	1.75	92.68
5	11530500	1969	273	7.74	2.43	14.10	1.04	94.45
5	11530500	1970	147	5.90	2.74	13.03	1.10	71.26
5	11530500	1972	156	5.14	2.82	13.01	1.11	54.09
5	12031000	1960	354	6.84	2.71	11.94	2.00	85.34
5	12031000	1962	300	6.95	2.81	12.17	2.06	84.70
5	12031000	1963	216	7.28	2.72	12.82	2.01	83.50
5	12031000	1964	308	6.33	2.68	12.10	1.45	90.92
5	12031000	1965	362	7.49	2.81	11.70	1.83	89.39
5	12031000	1966	365	7.68	2.68	12.00	1.61	91.35
5	12031000	1967	363	7.60	2.65	12.53	2.03	87.51
5	12031000	1968	363	7.21	2.76	11.79	2.00	86.68
5	12031000	1969	355	8.23	2.81	11.60	1.89	90.26
5	12031000	1970	364	7.13	2.80	11.66	2.07	85.62
5	12031000	1971	364	7.35	2.73	11.21	2.25	84.27
5	12200500	1963	349	5.24	2.55	9.33	1.02	93.21
5	12200500	1964	366	4.22	2.40	8.18	0.99	88.89
5	12200500	1965	358	4.77	2.53	9.00	0.98	92.26
5	12200500	1966	363	4.47	2.53	9.14	0.92	92.15
5	12200500	1967	365	4.91	2.52	8.84	1.00	91.44
5	12200500	1968	366	4.60	2.63	9.21	0.95	90.82
5	12200500	1969	354	5.49	2.58	8.04	0.90	94.86
5	12200500	1970	330	5.20	2.57	9.30	0.80	95.37
5	12433000	1960	360	8.19	2.50	10.44	1.12	96.38
5	12433000	1961	363	9.16	2.61	11.93	1.21	96.68
5	12433000	1962	363	6.91	2.55	12.18	1.00	96.03
5	12433000	1967	365	7.93	2.47	11.16	1.09	95.99
5	12433000	1968	345	8.39	2.31	11.75	1.84	91.59
5	12433000	1969	363	8.67	2.49	10.37	0.96	97.62
5	12433000	1970	355	8.67	2.51	11.05	1.12	96.69
5	12510500	1959	339	9.46	2.80	11.68	2.10	90.85
5	12510500	1960	332	10.91	2.88	12.30	2.45	90.42
5	12510500	1961	340	9.94	2.77	13.10	2.32	90.02
5	12510500	1962	348	10.04	2.84	12.83	2.09	91.94
5	12510500	1963	354	9.73	2.76	12.94	1.82	93.44
5	12510500	1964	348	8.00	2.79	12.08	1.63	92.26
5	12510500	1965	340	8.98	2.82	11.46	1.77	92.71
5	12510500	1966	323	8.62	2.78	12.41	1.56	94.21
5	12510500	1967	361	8.64	2.72	12.37	1.66	93.14
5	12510500	1968	358	9.46	2.84	12.01	1.66	94.10
5	12510500	1969	346	9.65	2.77	11.50	1.43	95.56
5	12510500	1970	360	8.83	2.88	11.98	1.88	91.75
5	12510500	1971	354	9.05	2.75	11.24	2.40	87.69

APPENDIX C.--ANNUAL RESULTS OF HARMONIC FITS OF AVAILABLE STREAM TEMPERATURE DATA FOR STATIONS USED IN THE ASSESSMENT.--CONTINUED

NTYPE	STATION NO.	WY	N	A	C	M	SE	VAR
5	13154500	1959	359	5.05	2.81	14.33	1.02	92.54
5	13154500	1960	363	5.28	2.84	13.77	1.17	91.09
5	13154500	1961	361	5.25	2.91	14.17	0.97	93.67
5	13154500	1962	365	6.00	2.78	13.35	1.06	93.05
5	13154500	1963	364	5.43	2.77	14.04	1.16	91.68
5	13154500	1964	365	5.72	2.70	13.40	1.30	90.62
5	13154500	1965	363	6.50	2.74	12.87	1.11	94.49
5	13154500	1966	365	7.01	2.84	13.31	1.25	93.32
5	13154500	1967	361	4.94	2.70	13.97	1.44	85.39
5	13154500	1969	365	7.25	2.79	12.70	1.15	94.75
5	13154500	1970	365	5.28	2.82	13.33	1.47	85.90
5	13154500	1971	365	6.76	2.75	12.34	1.12	94.30
5	13154500	1972	366	7.13	2.87	12.06	1.24	94.00
5	13212500	1959	365	8.65	2.89	14.99	2.28	87.01
5	13212500	1960	366	10.10	2.81	13.94	2.43	88.63
5	13212500	1961	365	10.21	2.94	15.63	2.08	91.79
5	13212500	1962	364	9.37	2.94	14.52	2.26	89.59
5	13212500	1963	360	8.25	2.77	14.41	2.52	84.16
5	13212500	1964	360	8.81	2.74	13.43	2.28	88.21
5	13212500	1965	266	7.95	2.63	12.67	2.03	88.26
5	13212500	1966	223	10.11	2.63	13.48	1.77	95.49
5	13212500	1967	364	8.46	2.79	13.80	2.13	88.81
5	13212500	1969	365	8.62	2.66	12.04	1.66	92.81
5	13212500	1970	365	7.36	2.69	11.56	2.12	84.26
5	13212500	1971	365	8.45	2.60	11.08	1.94	89.70
5	13212500	1972	364	8.30	2.62	11.63	1.82	91.15

Appendix C.--Explanation of notation

NTYPE - Form of input data:

2--USGS card form no. 9-1540, daily records, two cards per month, nearest 0.5°C.
3--Daily temperature cards, one card per month, Celsius units, nearest whole °C.
4--Daily temperature cards, one card per month, Fahrenheit units, nearest whole °F (output expressed in Celsius units).
5--USGS card form no. 9-1844, daily records, four cards per month, obtained from WRD daily values file.

Station No. - USGS station number

WY - Water year record begins on October 1 of the year preceding that which is specified and ends on September 30 of the specified year.

N - Total number of daily temperature values excluding 0°C or missing days for specified water year that were used in analysis (maximum possible equals 365 or 366).

A - Annual amplitude of the stream-temperature curve, in °C.

C - Phase angle of the harmonic, in radians.

M - Harmonic mean annual water temperature, in °C.

SE - Standard error of estimate of Y, a daily temperature value, in °C. Two-thirds of the daily temperature values estimated using the harmonic relation should fall within ± SE of the recorded temperature.

VAR - Percentage of the variation in daily temperature values that is accounted for by the harmonic function.

Appendix D.—Summary of mean and extreme data values for selected variables for available data during water years 1966–72

Code number	Station number	NT	N1	Stream discharge Min	Stream discharge Mean	Stream discharge Max	N2	NO_3 Min	NO_3 Mean	NO_3 Max	N3	Cl Min	Cl Mean	Cl Max
1	01184000	149	104	3.8	15,800	94,000	73	0.1	1.8	12	82	4.6	11	28
2	01463500	146	93	2,430	14,200	67,100	63	.0	4.5	9.5	71	5.0	9.0	27
3	01474500	153	132	46	2,390	16,000	106	1.3	12	22	94	11	29	54
4	01491000	121	121	1.5	139	1,470	77	.6	3.5	7.0	83	3.5	10	21
5	01673000	194	110	22	1,040	6,730	170	.1	1.2	5.2	194	2.0	4.4	6.8
6	02083500	49	39	54	1,110	6,560	35	.4	1.6	4.0	40	4.5	10	23
7	02129000	82	82	294	8,600	44,700	32	.3	1.5	3.2	41	5.0	8.1	11
8	02252500	49	49	5.7	43	860	13	.0	.3	1.0	8	102	183	285
9	02253000	49	49	4.5	97	1,170	13	.0	.7	2.5	8	140	261	395
10	02253500	49	48	3.7	64	905	12	.1	.7	1.8	8	85	192	350
11	02256500	89	53	0	147	770	69	.0	.6	3.2	40	12	53	360
12	02273200	88	57	0	269	1,800	70	.0	.4	1.5	37	7.5	13	19
13	02277000	68	11	0	9.5	50	57	.0	.6	2.6	30	38	97	394
14	02285000	63	12	0	124	667	47	.0	1.4	4.3	30	49	81	208
15	02296750	232	119	94	919	5,560	204	.0	1.1	8.3	175	8.0	15	23
16	02313000	83	36	192	912	3,100	61	.0	.3	1.7	46	6.0	9.6	58
17	02320500	104	50	0.7	6,310	18,100	72	.0	.9	1.0	41	4.0	5.9	8.0
18	02321500	83	47	3.4	676	3,800	68	.0	.5	2.7	39	4.0	9.9	14
19	02489500	112	104	1,210	6,840	47,000	106	.0	.4	1.3	110	3.0	9.2	28
20	03049655	235	230	1,140	19,690	79,800	149	.7	2.9	7.3	124	7.7	16	40
21	03251500	214	214	16	5,120	28,600	172	.3	2.9	10	171	.5	11	170
22	03276600	317	0	−10	−10	−10	238	1.2	15	42	240	8.0	40	87
23	03277200	199	0	−10	−10	−10	191	.3	7.0	22	191	7.0	36	81
24	05054000	185	179	14	1,300	24,300	60	.0	1.3	13	70	2.6	6.9	39
25	05082500	164	162	540	5,200	54,000	59	.0	1.1	8.9	69	3.6	8.9	22
26	05124000	125	124	1	437	6,250	74	.0	3.6	14	84	4.6	29	85
27	06185500	194	169	5,330	12,460	23,700	64	.0	.3	8.8	72	3.9	8.5	11
28	06214500	194	193	1,330	8,110	48,560	70	.0	.7	12	70	1.1	5.9	10
29	06294700	147	147	685	4,340	23,000	32	.0	.9	2.0	53	3.5	11	19
30	06308500	182	180	33	558	4,140	35	.0	.2	1.2	55	.8	4.5	12
31	06329500	203	182	2,800	14,300	62,520	57	.0	.7	3.0	66	3.6	11	23
32	06478500	93	75	8.3	211	1,720	48	.0	2.5	26	46	24	67	160
33	06807000	186	155	11,000	43,420	141,000	42	.0	2.3	13	39	7.0	17	38
34	06877600	196	196	61	1,530	17,500	79	.2	3.0	7.1	166	12	32	1,110

35	06887000	86	86	13	1,780	24,100	86	.4	3.3	9.3	86	6.0	18	
36	06892500	86	86	593	7,440	71,800	85	.2	5.3	26	85	7.0	67	200
37	07139500	101	101	4.3	131	1,230	84	.9	8.7	19	84	20	84	140
38	07146500	507	441	222	2,250	26,600	367	.0	6.1	18	439	25	326	1,850
39	07161000	424	378	2.4	913	15,400	226	.1	4.4	32	393	14	2,730	8,650
40	07164400	377	344	113	5,580	91,700	239	.0	2.0	4.9	337	32	546	1,550
41	07178600	316	282	31	4,680	33,500	215	.1	5.1	41	304	6.5	86	465
42	07193500	119	87	19	7,070	45,600	78	.0	.9	3.5	78	4.8	11	18
43	07245000	350	301	57	3,970	35,000	229	.0	.8	3.8	288	4.0	71	125
44	07263500	85	85	4,650	32,450	122,000	66	.0	1.2	3.8	76	18	110	292
45	07331000	493	386	8.4	1,160	19,000	351	.0	2.6	10	451	4.0	65	242
46	07331600	82	72	851	3,160	19,000	48	.0	1.9	5.0	82	215	34	442
47	07344400	103	102	800	15,500	131,000	103	.0	.3	4.3	103	5.3	128	320
48	07367000	106	22	1,200	20,100	64,400	95	.2	5.1	25	95	8.7	57	176
49	08030500	210	144	292	4,370	33,200	39	.0	.5	2.4	188	1.1	20	36
50	08041000	134	102	306	4,120	24,100	75	.0	.5	2.5	109	10	25	38
51	08065350	229	189	403	5,560	62,800	156	.0	11	53	211	9.6	81	550
52	08068000	214	180	8.2	660	9,720	131	.0	.6	8.0	179	2.4	42	140
53	08082500	314	278	0	596	11,200	105	.0	3.4	12	274	89	2,300	24,000
54	08123800	330	289	0	88	3,980	165	.0	7.9	57	317	16	997	6,150
55	08126500	209	182	0	261	5,210	114	.0	5.2	26	193	32	325	1,220
56	08158000	76	60	46	1,860	7,250	43	.0	1.6	6.3	69	23	48	70
57	08162000	161	120	46	3,430	42,400	59	.0	1.3	5.4	108	7.7	42	68
58	08164500	351	297	.11	873	22,400	213	.0	.7	5.0	331	4.4	48	159
59	08176500	133	106	304	3,000	19,800	77	.0	2.9	19	126	7.6	38	143
60	08188500	305	243	64	1,300	69,200	160	.0	8.4	22	277	2.2	91	200
61	08189500	259	209	.83	341	23,000	69	.6	4.0	15	251	1.8	1,550	14,000
62	08211000	61	52	91	1,480	13,800	27	.0	.3	1.5	61	8.8	50	120
63	08313000	370	361	5.4	1,180	4,830	200	.0	1.1	3.6	270	.0	7.6	44
64	08358300	338	337	0	801	2,110	97	.0	2.5	8.4	111	14	44	150
65	08407500	253	248	1.1	489	46,400	192	.0	2.8	11	207	25	4,870	14,500
66	09152500	215	215	541	2,210	11,400	94	.2	4.3	9.1	187	2.2	13	25
67	09180500	309	302	6.4	6,480	31,700	174	.4	6.5	24	209	21	122	695
68	09234500	120	114	440	2,400	4,330	48	2.2	6.6	11	96	13	21	34
69	09251000	155	155	36	1,760	8,240	45	.0	.9	4.5	132	1.8	15	50
70	09306500	232	221	103	708	3,940	24	.0	1.1	5.3	206	8.2	59	650
71	09315000	317	307	2,050	6,490	28,700	43	.7	3.9	12	212	7.8	28	70
72	09368000	454	429	127	1,860	12,600	266	.0	3.3	19	353	1.6	14	86
73	09379500	397	387	90	2,320	52,800	26	.2	4.0	9.0	283	6.3	22	325
74	09380000	276	275	1,630	12,400	25,000	44	2.4	3.9	5.5	88	25	55	75

Appendix D.—Summary of mean and extreme data values for selected variables for available data during water years 1960–72—Continued

Code number	Station number	NT	N1	Stream discharge Min	Stream discharge Mean	Stream discharge Max	N2	NO3 Min	NO3 Mean	NO3 Max	N3	Cl Min	Cl Mean	Cl Max
75	09421500	136	92	19	14,200	28,100	50	0.2	2.0	4.1	78	84	93	110
76	09502000	62	62	34	1,050	2,880	47	.0	.7	2.8	61	138	214	320
77	09510000	79	78	21	548	2,460	57	.0	.7	2.2	79	2.0	16	28
78	11152500	53	51	.68	518	8,950	12	1.7	21	83	31	11	75	157
79	11303500	169	157	403	6,520	41,700	53	.1	4.1	13	82	8.6	94	230
80	11477000	168	143	80	32,900	257,000	57	.0	.6	3.9	84	1.1	4.6	11
81	11530500	96	67	2,270	16,100	84,900	54	.0	.9	3.5	84	.8	3.0	6.8
82	12031000	78	78	187	3,760	29,800	57	.1	1.0	6.0	57	2.2	4.4	9.0
83	12200500	61	61	4,480	16,600	37,300	61	.0	.3	.7	61	.0	.5	1.0
84	12433000	75	74	336	8,190	32,400	54	.2	1.7	3.9	73	.4	2.0	6.0
85	12510500	151	151	4.6	3,350	13,100	131	.6	3.1	5.5	147	1.5	5.3	10
86	13154500	197	197	4,570	10,800	28,600	53	.0	2.6	6.1	34	16	24	30
87	13212500	122	122	59	1,110	6,920	19	.1	4.9	13	35	1.7	12	25
88	50071000	66	65	9.1	36	120	66	.0	.4	1.5	61	.9	12	15

Appendix D.—Summary of mean and extreme data values for selected variables for available data during water years 1966–72—Continued

Code number	Station number	NT	N4	DSR Min	DSR Mean	DSR Max	N5	DSS Min	DSS Mean	DSS Max	N6	HRD Min	HRD Mean	HRD Max
1	01184000	149	59	44	73	117	50	40	65	96	80	18	34	50
2	01463500	146	35	63	98	137	24	55	88	130	69	32	59	85
3	01474500	153	56	151	284	503	10	145	200	240	94	84	153	300
4	01491000	121	41	53	93	123	53	41	76	114	81	19	36	52
5	01673000	194	189	50	65	87	189	29	56	87	194	13	26	48
6	02083500	49	32	52	78	117	9	41	69	107	40	16	24	36
7	02129000	82	34	48	65	84	16	45	56	72	40	14	20	29
8	02252500	49	6	476	654	803	7	359	529	684	8	207	276	370
9	02253000	49	6	486	796	1,070	7	433	693	965	8	220	330	421
10	02253500	49	6	409	614	1,020	7	356	577	871	8	215	281	386
11	02256500	89	39	41	161	881	33	39	119	755	40	20	49	270
12	02273200	88	36	45	79	107	31	29	56	80	37	15	28	42
13	02277000	68	27	218	391	776	29	197	351	688	29	124	198	332
14	02285000	63	25	323	414	688	29	314	370	623	30	186	228	270
15	02296750	232	129	78	220	409	171	58	189	390	175	34	123	264
16	02313000	83	29	138	189	382	33	100	152	206	46	80	132	180
17	02320500	104	38	55	145	200	37	24	127	199	41	12	103	178
18	02321500	83	38	58	96	145	39	17	57	117	39	12	34	86
19	02489500	112	105	32	54	103	31	35	49	66	112	7	14	67
20	03049655	235	105	91	206	461	1	134	134	134	128	50	100	230
21	03251500	214	171	62	152	490	4	172	200	214	171	42	106	171
22	03276600	317	238	190	431	634	0	–10	–10	–10	240	157	308	390
23	03277200	199	144	120	276	436	0	–10	–10	–10	191	70	159	264
24	05054000	185	183	180	325	452	56	164	304	425	182	110	246	339
25	05082500	164	159	191	332	471	54	195	300	428	159	133	240	328
26	05124000	125	84	157	737	1,910	59	150	654	1,670	84	73	318	830
27	06185500	194	137	294	424	596	42	338	413	469	137	148	228	276
28	06214500	194	116	78	233	385	39	78	218	376	136	28	136	211
29	06294700	147	103	362	663	899	41	371	579	836	124	171	310	415
30	06308500	182	141	243	575	1,010	40	291	550	816	160	124	332	561
31	06329500	203	139	175	469	719	40	208	434	655	139	90	230	363
32	06478500	93	49	276	1,100	2,270	15	446	1,100	1,990	53	150	537	1,200
33	06807000	186	34	299	492	643	39	243	472	620	40	165	238	310
34	06877600	196	162	191	1,020	2,510	67	186	1,150	2,300	166	112	351	720

Appendix D.—Summary of mean and extreme data values for selected variables for available data during water years 1966–72—Continued

Code number	Station number	NT	N4	DSR Min	DSR Mean	DSR Max	N5	DSS Min	DSS Mean	DSS Max	N6	HRD Min	HRD Mean	HRD Max
35	06887000	86	86	137	262	416	60	125	255	399	86	76	177	282
36	06892500	86	85	183	430	744	61	182	420	727	85	124	239	374
37	07139500	101	84	454	1,850	3,110	83	455	1,810	3,100	84	237	837	1,400
38	07146500	507	431	132	975	4,090	0	–10	–10	–10	381	68	289	600
39	07161000	424	392	338	5,240	15,700	0	–10	–10	–10	331	108	496	1,080
40	07164400	377	337	152	1,250	3,090	0	–10	–10	–10	279	62	258	448
41	07178600	316	304	87	341	980	0	–10	–10	–10	252	42	168	358
42	07193500	119	78	138	175	207	0	–10	–10	–10	77	104	128	144
43	07245000	350	274	67	260	420	2	221	222	224	218	32	114	820
44	07263500	85	68	92	353	718	20	101	268	676	69	50	129	222
45	07331000	493	444	115	603	1,470	0	–10	–10	–10	408	80	363	860
46	07331600	82	0	–10	–10	–10	82	667	943	1,220	82	267	334	426
47	07344400	103	100	120	456	961	38	106	377	778	103	68	190	344
48	07367000	106	95	54	170	416	74	37	145	334	95	15	41	82
49	08030500	210	2	78	102	127	81	12	83	142	83	8	31	52
50	08041000	134	24	69	105	128	110	55	99	132	111	21	37	54
51	08065350	229	75	97	424	1,150	135	126	334	660	212	55	144	210
52	08068000	214	58	37	167	273	115	35	161	299	179	16	87	220
53	08082500	314	56	442	3,580	23,200	210	728	5,580	44,800	273	184	1,110	6,600
54	08123800	330	91	175	2,200	7,040	212	211	2,770	15,300	317	75	872	4,970
55	08126500	209	67	224	1,040	2,690	122	241	1,220	2,770	193	130	547	1,500
56	08158000	76	12	252	273	322	57	241	283	322	69	165	197	238
57	08162000	161	1	216	216	216	107	110	265	371	108	83	183	251
58	08164500	351	102	54	243	544	237	35	247	537	325	20	133	320
59	08176500	133	0	–10	–10	–10	121	126	279	543	122	96	195	306
60	08188500	305	71	108	457	683	218	103	504	840	277	44	266	453
61	08189500	259	0	–10	–10	–10	204	58	2,110	23,700	243	40	412	2,290
62	08211000	61	0	–10	–10	–10	61	164	295	422	61	100	164	220
63	08313000	370	92	154	284	580	218	135	266	691	271	83	156	440
64	08358300	338	120	0	627	1,910	107	259	513	1,300	177	126	271	900
65	08407500	253	100	342	10,300	29,300	157	570	11,300	28,800	207	216	2,010	3,920
66	09152500	215	161	84	883	1,750	56	216	723	1,540	187	105	476	912
67	09180500	309	187	289	876	1,930	121	262	738	1,370	209	170	399	750
68	09234500	120	74	455	547	653	59	425	503	631	96	238	283	344

69	09251000	155	111	74	267	477	38	79	275	436	132	48	150	252
70	09306500	232	184	242	564	2,380	39	203	466	639	206	125	279	780
71	09315000	317	188	224	617	3,440	119	215	584	3,160	212	120	314	1,880
72	09368000	454	120	195	526	1,290	277	174	459	2,020	356	118	240	800
73	09379500	397	262	248	672	1,560	150	227	627	1,480	283	158	340	1,030
74	09380000	276	45	347	595	780	64	493	595	752	88	191	297	388
75	09421500	136	53	664	744	810	61	671	731	810	78	316	348	380
76	09502000	62	20	402	523	764	49	393	585	762	61	121	174	210
77	09510000	79	21	192	281	402	66	178	304	396	79	132	204	274
78	11152500	53	51	368	547	760	2	630	694	757	31	102	293	554
79	11303500	169	3	154	373	704	74	58	358	686	82	26	142	280
80	11477000	168	3	90	127	162	77	64	141	212	84	42	110	180
81	11530500	96	1	85	85	85	77	55	108	202	84	40	73	103
82	12031000	78	57	38	58	82	15	44	59	73	58	14	25	36
83	12200500	61	61	15	35	43	19	22	33	43	61	13	22	30
84	12433000	75	54	44	82	125	16	45	82	107	73	25	55	101
85	12510500	151	130	84	175	246	23	95	190	222	145	48	100	142
86	13154500	197	123	162	299	381	16	241	308	351	119	85	185	222
87	13212500	122	121	88	295	421	16	70	269	406	121	36	127	187
88	50071000	66	22	55	85	107	45	51	84	105	61	22	35	50

Appendix D.—Summary of mean and extreme data values for selected variables for available data during water years 1966–72—Continued

Code number	Station number	NT	N7	KSC Min	KSC Mean	KSC Max
1	01184000	149	130	60	120	225
2	01463500	146	108	97	164	263
3	01474500	153	152	213	413	703
4	01491000	121	120	64	116	170
5	01673000	194	194	45	78	142
6	02083500	49	40	50	96	180
7	02129000	82	79	61	94	190
8	02252500	49	42	305	835	1,500
9	02253000	49	40	382	1,170	6,200
10	02253500	49	42	65	947	5,100
11	02256500	89	69	78	243	1,460
12	02273200	88	66	58	111	300
13	02277000	68	50	322	626	1,720
14	02285000	63	50	525	656	1,120
15	02296750	232	199	44	304	600
16	02313000	83	61	128	258	358
17	02320500	104	82	28	218	382
18	02321500	83	63	28	103	200
19	02489500	112	112	40	71	169
20	03049655	235	208	152	304	706
21	03251500	214	171	103	243	801
22	03276600	317	240	342	692	945
23	03277200	199	191	210	444	776
24	05054000	185	183	266	514	694
25	05082500	162	159	306	510	713
26	05124000	125	121	239	1,060	2,600
27	06185500	194	160	463	645	840
28	06214500	194	136	118	364	602
29	06294700	147	124	555	916	1,210
30	06308500	182	161	377	842	1,400
31	06329500	203	164	247	695	1,050
32	06478500	93	69	562	1,470	2,880
33	06807000	186	56	394	734	923

34	06877600	198	188	270	1,670	[illegible]
35	06887000	86	86	190	418	[illegible]
36	06892500	86	85	280	698	1,230
37	07139500	101	84	680	2,300	3,800
38	07146500	507	468	253	1,640	6,540
39	07161000	424	398	627	8,720	24,600
40	07164400	377	349	246	2,200	6,320
41	07178600	316	309	120	566	1,780
42	07193500	119	118	251	295	382
43	07245000	350	293	94	443	694
44	07263500	85	84	184	612	1,280
45	07331000	493	482	186	883	1,830
46	07331600	82	82	1,180	1,650	2,080
47	07344400	103	103	186	780	1,660
48	07367000	106	106	66	271	679
49	08030500	210	199	22	154	270
50	08041000	134	127	90	175	235
51	08065350	229	228	172	633	2,100
52	08068000	214	194	52	292	763
53	08082500	314	274	795	8,280	66,100
54	08123800	330	317	298	4,160	21,600
55	08126500	209	193	369	1,840	4,600
56	08158000	76	76	438	504	587
57	08162000	161	126	203	480	656
58	08164500	351	345	77	431	954
59	08176500	133	133	226	493	946
60	08188500	305	298	177	837	1,410
61	08189500	259	259	96	5,030	39,400
62	08211000	61	61	278	503	753
63	08313000	370	315	200	414	939
64	08358300	338	215	392	868	2,350
65	08407500	253	248	523	16,300	41,000
66	09152500	215	213	152	1,090	2,030
67	09180500	309	228	440	1,220	3,050
68	09234500	120	120	500	768	1,060
69	09251000	155	155	124	426	777
70	09306500	232	232	328	847	7,170
71	09315000	317	229	362	853	3,240
72	09368000	454	394	303	723	2,660
73	09379500	397	306	250	899	2,020

Code number	Station number	NT	N7	KSC Min	KSC Mean	KSC Max
74	09380000	276	115	511	908	1,180
75	09421500	136	111	900	1,120	1,280
76	09502000	62	61	719	1,030	1,410
77	09510000	79	79	307	493	655
78	11152500	53	32	255	934	1,620
79	11303500	169	91	92	631	1,260
80	11477000	168	85	99	238	369
81	11530500	95	84	91	172	274
82	12031000	78	78	44	75	120
83	12200500	61	61	33	60	69
84	12433000	75	74	61	128	216
85	12510500	151	146	118	265	397
86	13154500	197	124	298	489	596
87	13212500	122	122	119	461	664
88	50071000	66	66	79	118	149

Appendix D.—Notation

NT	- total number of samples
Min	- minimum value
Mean	- average of N_i determinations
Max	- maximum value
N1	- number of stream discharge determinations (reported to whole numbers unless decimal is provided)
N2	- number of nitrate NO_3 determinations (reported to whole numbers unless decimal is provided)
N3	- number of chloride Cl determinations (reported to whole numbers unless decimal is provided)
N4	- number of dissolved-solids residue (DSR) determinations (reported to whole numbers)
N5	- number of dissolved-solids sum (DSS) determinations (reported to whole numbers)
N6	- number of hardness (HRD) determinations (reported to whole numbers)
N7	- number of specific conductance (KSC) determinations (reported to whole numbers)
−10	- indicates no data values are given

Appendix B.—Summary of mean and extreme annual mean discharge-weighted values for selected variables

Code number	Station number	NYRS	N1	Q Min	Q Mean	Q Max	N2	NO_3 Min	NO_3 Mean	NO_3 Max	N3	Cl Min	Cl Mean	Cl Max
1	01184000	10	10	9,760	21,100	53,700	8	0.5	1.2	2.1	10	1.4	7.5	11
2	01463500	21	21	8,210	11,900	17,520	20	.1	.1	.3	21	3.0	4.6	6.8
3	01474500	27	27	1,280	2,460	4,250	26	5.0	8.5	13	24	7.0	13	33
4	01491000	8	8	27	111	171	7	2.0	3.1	4.1	8	5.5	8.6	11
5	01673000	9	9	25	719	1,220	9	.1	.7	1.4	9	2.4	3.4	4.5
6	02083500	11	11	387	1,820	3,400	9	.0	1.0	1.4	11	4.0	6.6	9.0
7	02129000	12	12	4,380	8,240	14,200	9	.9	1.6	2.2	11	3.9	6.2	8.8
8	02252500	16	16	3.4	43	137	10	.1	.2	.5	9	34	89	154
9	02253000	17	17	32	99	310	12	.0	.5	1.9	11	47	154	251
10	02253500	17	17	13	58	146	11	.0	.8	4.7	10	31	113	192
11	02256500	8	8	.9	176	662	7	.0	.3	.8	6	7.8	35	93
12	02273200	5	5	8.3	292	786	4	.0	1.0	2.9	3	12	12	13
13	02277000	4	4	16	820	3,240	4	.2	1.2	3.5	4	25	90	167
14	02285000	3	3	379	441	534	3	1.0	1.6	2.4	3	51	63	72
15	02296750	9	9	384	1,080	2,760	8	.0	.9	2.9	7	3.6	12	15
16	02343000	9	9	400	1,589	3,790	9	.1	.4	1.5	9	6.8	7.8	10
17	02320500	10	10	1,950	5,910	13,500	9	.0	.3	.6	9	4.5	6.5	10
18	02321500	7	7	332	851	2,690	6	.3	.6	1.5	6	4.0	8.4	11
19	02489500	8	8	3,430	6,240	10,200	8	.2	.7	1.2	8	6.2	7.6	9.3
20	03049655	4	4	4,170	15,500	22,100	0	−1.0	−1.0	−1.0	0	−1.0	−1.0	−1.0
21	03251500	12	12	780	3,330	5,610	5	2.2	3.1	3.8	5	3.7	5.3	7.4
22	03276600	12	0	−10	−10	−10	11	13	15	19	12	2.7	3.9	5.0
23	03277200	6	0	−10	−10	−10	3	4.9	5.2	5.4	3	2.9	3.0	3.1
24	05054000	17	17	213	698	1,760	3	1.0	2.7	5.0	3	3.8	5.2	6.8
25	05082500	16	16	763	3,340	6,050	2	1.2	1.4	1.6	2	5.5	6.7	8.0
26	05124000	15	15	6.1	275	1,370	8	.4	3.7	5.7	10	8.9	18	31
27	06185500	7	7	10,900	12,100	13,400	0	−1.0	−1.0	−1.0	3	8.2	9.0	10
28	06214500	17	17	4,010	7,570	9,350	6	.3	1.0	1.8	7	3.3	4.1	5.0
29	06294700	22	22	1,620	3,770	5,860	3	2.4	3.6	5.1	5	9.2	11	15
30	06308500	22	22	188	424	658	3	1.5	1.9	2.2	6	2.5	3.4	4.6
31	06329500	22	22	5,880	12,100	17,350	3	2.8	2.5	3.2	5	7.5	8.3	10
32	06478500	8	8	72	531	2,310	3	1.7	2.8	3.6	6	11	45	85
33	06807000	21	21	25,400	35,800	60,400	6	.9	3.4	5.1	5	13	14	16
34	06877600	12	12	293	1,250	2,560	5	2.9	3.2	4.0	12	70	184	318

35	06887000	13	13	512	1,190	4,430	13	1.5	3.7	6.0	13	7.9	14	19
36	06892500	10	10	2,140	7,520	11,710	7	4.1	5.1	6.3	10	19	45	98
37	07139500	7	7	49	136	259	7	5.7	7.2	9.0	7	33	73	92
38	07146500	20	20	457	1,730	3,260	16	.6	5.6	9.6	20	140	270	497
39	07161000	18	18	235	1,050	3,450	5	2.8	4.3	6.0	18	629	1,520	2,890
40	07164400	23	23	1,280	6,600	15,600	12	1.3	2.6	3.8	23	348	598	1,370
41	07178600	23	23	297	3,760	9,390	17	1.9	3.1	4.5	23	35	69	123
42	07193500	19	19	1,160	6,350	13,300	13	.5	3.0	6.5	15	9.1	13	19
43	07245000	21	21	97	5,200	11,600	11	.7	2.5	4.0	21	75	299	978
44	07263500	26	26	10,200	38,100	72,500	26	.3	2.3	3.6	26	54	124	297
45	07331000	22	22	340	1,370	5,650	17	1.6	3.0	5.2	22	25	46	68
46	07331600	27	27	1,510	4,230	10,900	25	.8	1.6	4.0	27	139	311	431
47	07344400	16	15	5,760	15,400	34,500	16	.2	.5	1.0	16	31	87	133
48	07367000	6	6	6,490	14,800	28,700	6	.4	2.0	3.5	6	27	51	109
49	08030500	24	24	1,960	6,950	15,900	22	.2	.9	1.8	24	15	29	47
50	08041000	24	24	1,130	4,580	11,400	22	.4	.8	1.5	24	13	25	39
51	08065350	8	8	1,200	4,920	9,360	6	2.8	6.2	13	8	27	52	115
52	08068000	10	10	49	379	766	8	.5	1.0	1.8	10	20	34	58
53	08082500	12	12	88	318	807	0	−1.0	−1.0	−1.0	12	614	1,140	2,030
54	08123800	12	12	5.2	28	59	9	2.1	3.7	6.2	12	123	399	1,160
55	08126500	9	9	16	103	210	8	1.1	3.2	6.9	9	136	250	491
56	08158000	24	24	729	1,780	4,900	22	.8	1.7	3.8	24	24	47	84
57	08162000	27	27	615	2,480	6,130	25	.3	1.9	4.4	27	22	38	67
58	08164500	12	12	122	587	1,510	10	.5	1.1	1.5	12	15	27	50
59	08176500	24	24	132	1,430	3,860	22	1.0	3.0	6.1	24	20	51	160
60	08188500	13	13	196	589	1,160	11	1.6	8.0	11	13	20	73	102
61	08189500	9	9	11	135	647	0	−1.0	−1.0	−1.0	9	153	1,780	5,790
62	08211000	24	24	104	742	2,170	22	.2	1.5	3.5	24	9.7	41	87
63	08313000	26	26	519	1,120	2,110	24	.7	1.0	1.7	26	4.2	6.4	8.4
64	08358300	19	19	63	523	1,230	2	2.4	2.6	2.7	4	33	35	41
65	08407500	35	35	25	190	1,660	33	1.7	3.7	8.0	35	397	2,350	6,430
66	09152500	39	39	660	2,320	4,430	21	2.1	4.4	12	28	5.6	11	25
67	09180500	38	38	3,070	6,850	11,800	25	2.6	6.4	18	27	39	84	130
68	09234500	15	15	231	2,020	3,020	7	1.0	3.3	7.5	14	12	19	27
69	09251000	22	22	721	1,460	2,460	14	.6	1.5	2.7	22	4.5	7.2	14
70	09306500	21	21	466	676	1,000	8	.8	6.2	25	17	20	47	66
71	09315000	38	38	1,800	5,540	9,430	16	1.0	1.8	3.2	24	18	26	44
72	09368000	18	18	702	1,940	3,860	17	1.2	3.1	9.0	18	6.6	12	26
73	09379500	42	42	854	2,260	5,860	32	1.4	2.5	5.2	42	8.1	14	33
74	09380000	29	29	3,320	14,600	26,500	21	1.7	3.3	5.2	23	34	50	75

Appendix E.—*Summary of mean and extreme annual mean discharge-weighted values for selected variables*—Continued

Code number	Station number	NYRS	N1	Q Min	Q Mean	Q Max	N2	NO3 Min	NO3 Mean	NO3 Max	N3	Cl Min	Cl Mean	Cl Max
75	09421500	22	22	9,240	14,900	25,000	13	2.0	2.7	3.5	16	64	81	96
76	09502000	21	21	362	834	1,600	10	.4	1.1	2.4	10	129	227	472
77	09510000	21	21	169	446	862	9	.3	.9	1.7	10	9.6	16	24
78	11152500	15	15	1.2	308	2,060	1	3.8	3.8	3.8	15	17	45	141
79	11303500	15	15	604	3,670	9,900	13	1.0	2.2	3.6	15	18	75	176
80	11477000	20	20	2,130	8,800	21,600	0	−1.0	−1.0	−1.0	11	2.4	3.7	7.2
81	11530500	20	20	10,300	19,000	32,000	3	.5	.8	1.1	18	1.2	2.6	3.9
82	12031000	10	10	2,330	3,590	5,220	9	.8	1.3	1.8	9	2.7	3.4	3.9
83	12200500	11	11	13,200	17,400	21,700	11	.2	.4	.5	11	.2	.4	.5
84	12433000	12	12	5,170	8,010	10,700	11	1.1	1.3	1.6	12	1.1	1.4	2.1
85	12510500	19	19	2,190	3,690	7,060	13	1.3	2.3	3.8	14	3.5	4.6	6.4
86	13154500	20	20	7,460	10,400	14,300	8	2.7	3.1	3.4	9	21	25	28
87	13212500	21	21	379	1,390	3,590	8	2.0	2.6	3.8	10	3.8	8.3	22
88	50071000	11	11	26	37	48	10	.0	.4	1.4	10	10	11	14

Appendix E.—Summary of mean and extreme annual mean discharge-weighted values for selected variables

Code number	Station number	NYRS	N4	DS Min	DS Mean	DS Max	N5	KSC Min	KSC Mean	KSC Max	N6	HRD Min	HRD Mean	HRD Max
1	01184000	10	5	47	53	58	9	69	92	119	9	27	30	37
2	01463500	21	13	65	79	89	21	107	123	143	19	43	47	54
3	01474500	27	18	166	192	246	27	264	311	493	24	107	124	199
4	01491000	8	4	53	67	83	8	82	102	124	8	24	31	40
5	01673000	9	8	47	53	60	7	52	65	88	9	16	20	27
6	02083500	11	10	41	59	69	10	60	73	89	11	16	19	26
7	02129000	12	10	46	55	64	10	72	81	98	11	17	19	22
8	02252500	16	8	151	344	522	13	274	636	1,050	9	86	184	244
9	02253000	17	10	198	501	669	15	364	880	1,220	11	117	262	329
10	02253500	17	9	134	402	581	15	254	737	1,390	10	77	208	306
11	02256500	8	6	32	84	198	7	58	146	360	6	20	35	74
12	02273200	5	3	50	55	61	3	96	105	115	3	26	28	30
13	02277000	4	3	182	275	460	4	329	596	949	4	130	177	251
14	02285000	3	3	327	362	409	3	565	633	699	3	233	245	278
15	02296750	9	7	64	115	152	7	110	183	243	7	36	69	94
16	02313000	9	9	86	141	186	9	150	238	321	9	72	117	158
17	02320500	10	8	71	135	191	9	121	202	298	9	54	98	146
18	02321500	7	5	76	96	123	6	42	71	92	6	14	23	31
19	02489500	8	8	41	45	52	8	57	67	78	8	14	15	16
20	03049655	4	0	−10	−10	−10	4	237	305	491	1	78	78	78
21	03251500	12	12	112	123	159	11	172	193	242	8	75	87	106
22	03276600	12	11	410	442	492	12	659	705	796	12	300	315	333
23	03277200	6	3	234	240	250	5	390	420	475	3	132	137	144
24	05054000	17	16	282	335	399	17	44	520	604	17	202	245	286
25	05082500	16	15	296	335	367	16	454	515	584	16	212	243	272
26	05124000	15	14	298	588	921	15	457	887	1,310	15	147	263	382
27	06185500	7	7	405	423	441	7	621	644	655	7	216	229	239
28	06214500	17	17	153	182	275	17	242	286	421	17	91	106	161
29	06294700	22	22	491	666	966	22	703	943	1,310	22	224	314	433
30	06308500	22	22	301	472	685	22	536	705	1,000	22	223	283	390
31	06329500	22	22	352	428	535	22	522	639	789	22	173	212	261
32	06478500	8	6	334	735	1,070	7	503	1,029	1,500	8	175	371	505
33	06807000	21	18	384	445	510	21	575	683	765	18	207	224	250
34	06877600	12	12	384	690	1,020	12	609	1,143	1,730	12	185	280	411

69	09251000	22	22	126	166	235	[illegible]	200	256	383	22	81	98	133
70	09306500	21	20	403	472	584	21	469	726	956	17	184	243	268
71	09315000	38	34	370	468	600	25	562	694	880	26	197	244	283
72	09368000	18	18	233	359	589	18	358	548	869	18	130	190	285
73	09379500	42	42	312	485	852	35	460	695	1,180	42	186	261	416
74	09380000	29	29	447	603	1,000	27	680	905	1,450	29	231	309	459
75	09421500	22	22	622	711	837	22	938	1,071	1,230	22	302	346	391
76	09502000	21	21	406	650	1,050	21	721	1,174	1,910	21	142	181	231
77	09510000	21	21	208	294	389	21	335	480	632	21	143	199	258
78	11152500	15	0	−10	−10	−10	15	392	678	1,350	15	151	244	425
79	11303500	15	13	110	282	545	15	167	468	968	15	47	110	210
80	11477000	20	0	−10	−10	−10	20	114	148	188	11	52	64	82
81	11530500	20	3	87	94	101	20	112	132	161	18	46	57	70
82	12031000	10	9	46	51	55	10	55	60	71	9	17	19	23
83	12200500	11	11	31	35	37	11	48	50	55	11	20	21	23
84	12433000	12	11	62	68	79	12	89	103	129	12	38	44	56
85	12510500	19	18	115	144	185	19	170	219	294	19	65	82	110
86	13154500	20	20	280	320	334	20	470	511	531	20	187	199	205
87	13212500	21	20	117	246	436	21	179	383	660	21	55	111	185
88	50071000	11	6	77	81	87	11	104	112	127	9	26	33	40

Appendix E.—*Summary of mean and extreme annual mean discharge-weighted values for selected variables*—Continued

Code number	Station number	NYRS	N4	DS Min	DS Mean	DS Max	N5	KSC Min	KSC Mean	KSC Max	N6	HRD Min	HRD Mean	HRD Max
35	06887000	13	13	165	221	267	13	251	353	467	13	100	146	193
36	06892500	10	10	236	350	500	10	364	568	835	10	147	208	273
37	07139500	7	7	735	1,640	2,220	7	999	2,071	2,620	7	368	748	960
38	07146500	20	20	493	849	1,320	20	840	1,408	2,230	20	177	270	438
39	07161000	18	18	1,430	3,050	5,580	17	2,480	5,071	9,320	18	234	381	571
40	07164400	23	22	872	1,350	2,750	23	1,540	2,351	4,730	23	189	292	448
41	07178600	23	23	195	285	413	23	313	466	676	23	102	141	209
42	07193500	19	15	147	189	235	19	229	302	375	15	97	131	165
43	07245000	21	20	267	704	1,960	21	432	1,192	3,280	20	108	216	482
44	07263500	26	25	217	384	680	26	358	643	1,180	26	90	129	172
45	07331000	22	22	303	480	705	22	465	706	971	22	200	300	432
46	07331600	27	27	538	931	1,230	27	874	1,580	2,100	27	245	340	428
47	07344400	16	16	182	341	488	16	330	576	862	16	111	152	225
48	07367000	6	6	84	143	267	6	139	231	431	6	25	35	60
49	08030500	24	22	75	103	139	24	117	165	235	22	22	30	39
50	08041000	24	24	66	102	140	24	109	166	222	24	24	33	40
51	08065350	8	8	215	287	437	8	376	503	781	8	121	137	153
52	08068000	10	10	105	145	213	10	188	255	371	10	66	80	112
53	08082500	12	12	1,840	2,890	4,690	12	2,900	4,567	7,400	12	609	753	975
54	08123800	12	12	439	1,130	3,050	12	770	1,830	4,820	12	192	398	1,010
55	08126500	9	9	458	793	1,320	9	825	1,326	2,110	9	194	334	599
56	08158000	24	24	201	268	351	24	349	475	632	24	124	173	207
57	08162000	27	27	198	256	328	27	331	442	584	27	124	164	203
58	08164500	12	12	95	149	228	12	172	253	393	12	55	79	116
59	08176500	24	24	191	305	532	24	337	518	881	24	139	188	246
60	08188500	13	13	191	425	524	13	317	701	863	13	126	233	271
61	08189500	9	7	409	3,660	9,650	8	693	4,493	13,300	9	137	368	975
62	08211000	24	24	141	277	382	24	224	456	657	24	86	136	186
63	08313000	26	26	188	227	281	26	293	351	434	26	113	135	161
64	08358300	19	19	399	548	911	19	602	812	1,280	19	194	246	372
65	08407500	35	35	1,420	6,190	13,900	34	2,200	9,090	21,300	35	550	1,830	2,620
66	09152500	39	39	433	709	1,300	35	602	915	1,530	31	246	384	626
67	09180500	38	33	440	686	1,020	26	679	1,003	1,490	27	239	342	493
68	09234500	15	14	356	479	650	15	544	711	946	15	202	259	336

Appendix E.—Notation

NYRS	- total number of years of record (see appendix B-2)
Min	- minimum annual value*
Mean	- average of N_i annual values*
Max	- maximum annual value*
N1	- number of discharge (Q) annual mean values (reported to whole numbers unless decimal is provided)
N2	- number of nitrate (NO_3) annual mean concentrations (reported to whole numbers unless decimal is provided)
N3	- number of chloride (Cl) annual mean concentrations (reported to whole numbers unless decimal is provided)
N4	- number of dissolved-solids (DS) annual mean concentrations (reported to whole numbers)
N5	- number of annual mean specific conductance (KSC) (reported to whole numbers)
N6	- number of hardness (HRD) annual mean values (reported to whole numbers)
−1.0 or −10	- indicates that no data values are given

*discharge weighted for all chemical constituents except for station numbers 03276600 and 03277200.

Co number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
1	01184000	1953	23,300	4.3	9.4	1.1	2.8	22	14	2.2	47	73	28	7.2	1.2	0.1
		1954	53,700	−1.0	−1.0	−1.0	−10	23	12	1.4	−10	69	27	6.7	.6	−.1
		1956	19,400	5.7	8.5	1.9	3.9	22	12	8.4	51	85	29	6.7	1.8	.1
		1966	15,300	4.7	8.7	1.4	−1.0	20	12	7.6	53	92	27	6.7	1.0	.1
		1967	9,760	4.6	12	2.0	8.6	28	16	11	−10	119	37	6.7	−1.0	.2
		1968	24,000	4.2	11	1.5	5.2	29	12	8.4	58	103	34	6.7	.5	.1
		1969	18,700	4.7	8.9	1.4	5.5	20	12	8.7	54	94	28	6.9	1.2	.1
		1970	16,000	−1.0	−1.0	−1.0	−1.0	23	12	8.6	−10	98	29	7.0	−1.0	−.1
		1971	14,500	4.7	8.9	1.4	5.4	20	11	8.7	−10	94	28	6.8	2.1	.1
		1972	16,500	−1.0	9.4	1.4	−1.0	24	10	9.6	−10	−10	−10	−.1	1.6	−.1
2	01463500	1945	14,760	4.0	11	3.6	2.9	28	20	3.0	65	107	43	6.9	3.0	.1
		1946	13,200	4.2	12	3.9	3.7	32	20	3.7	70	118	47	7.0	2.9	.1
		1947	13,390	4.2	12	3.8	3.5	29	21	3.6	71	112	45	6.9	2.9	−.1
		1948	12,940	−1.0	−1.0	−1.0	−1.0	31	20	−1.0	−10	119	−10	7.0	−1.0	−.1
		1949	10,970	4.8	−1.0	−1.0	−1.0	32	21	−1.0	−10	123	−10	6.9	2.9	−.1
		1950	11,100	−1.0	−1.0	−1.0	−1.0	30	19	4.0	−10	114	43	6.9	2.7	−.1
		1951	14,730	4.8	11	3.8	3.4	29	19	4.2	71	112	44	7.2	2.5	.1
		1952	17,620	−1.0	−1.0	−1.0	−1.0	27	18	3.7	−10	114	45	7.2	2.7	−.1
		1953	14,200	−1.0	−1.0	−1.0	2.5	28	20	4.4	−10	115	47	6.9	3.4	−.1
		1954	9,190	6.4	12	3.4	5.2	28	22	5.1	80	125	44	7.1	3.1	.1
		1955	12,300	6.7	12	3.7	6.6	32	23	4.6	85	123	44	7.2	3.2	.1
		1956	15,400	5.3	11	3.7	5.0	31	21	3.3	78	115	43	7.2	2.8	.1
		1957	8,540	−1.0	−1.0	−1.0	5.8	38	23	4.8	−10	136	51	7.2	4.0	−.1
		1958	13,400	−1.0	−1.0	−1.0	4.5	29	21	3.9	−10	114	44	6.8	3.4	−.1
		1959	9,610	−1.0	−1.0	−1.0	5.8	36	25	5.0	86	139	51	7.0	3.4	−.1
		1960	14,700	−1.0	−1.0	−1.0	4.9	28	22	4.0	76	112	43	6.9	3.4	−.1
		1961	10,600	5.6	13	4.4	4.7	36	20	4.9	80	126	50	7.2	3.2	.1
		1962	8,210	5.1	13	4.7	6.2	36	22	6.3	87	138	51	7.1	3.8	.1
		1963	8,260	3.9	13	4.2	4.9	34	22	6.0	85	143	51	7.1	3.7	.1
		1964	8,590	−1.0	−1.0	−1.0	−1.0	37	25	6.7	−10	143	54	7.0	4.0	−.1
		1966	8,510	3.9	13	4.3	5.8	26	26	6.8	89	138	49	6.7	4.6	.3
3	01474500	1946	3,200	9.2	27	11	9.5	45	73	7.4	170	264	131	7.2	5.9	−.1
		1947	2,330	8.1	26	11	11	37	83	7.3	180	275	111	6.9	5.1	−.1
		1948	2,760	9.0	26	10	11	45	69	7.6	174	264	108	6.9	6.9	.1
		1949	2,490	9.8	26	10	12	50	67	7.9	175	264	108	7.0	7.2	.1

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
3	01474500	1950	2,120	8.7	27	11	9.3	42	74	7.9	182	279	113	6.9	7.5	0.1
		1951	3,130	8.1	26	12	9.1	36	79	7.4	177	276	113	8.3	6.0	.1
		1952	4,050	8.0	25	12	8.2	38	71	8.0	166	270	110	7.5	5.8	.1
		1953	4,250	−1.0	−1.0	−1.0	8.5	42	63	7.0	−10	308	127	8.9	7.4	−.1
		1954	1,820	11	26	11	9.4	40	68	10	183	286	110	7.1	8.2	.1
		1955	2,200	11	29	12	16	53	85	12	213	321	119	7.5	8.5	.1
		1956	3,110	11	27	11	13	50	74	9.1	191	293	114	7.3	7.6	.2
		1957	1,920	−1.0	−1.0	−1.0	−1.0	51	71	9.7	−10	294	115	7.5	8.8	−.1
		1958	2,910	−1.0	−1.0	−1.0	9.1	43	70	8.9	−10	264	107	6.9	8.7	−.1
		1959	1,790	−1.0	−1.0	−1.0	13	57	74	12	201	308	121	7.1	8.2	−.1
		1960	2,640	11	25	10	9.8	48	69	9.7	184	272	111	7.1	8.5	.2
		1961	2,290	12	28	12	10	61	67	11	188	289	199	7.1	5.0	.2
		1962	1,850	11	29	11	12	58	66	14	196	302	117	7.0	8.7	.2
		1963	2,190	9.5	29	13	13	53	79	16	208	350	128	7.1	9.2	.2
		1964	2,450	8.4	30	12	14	56	73	17	210	319	121	7.0	7.7	.2
		1965	1,290	9.1	34	13	19	63	87	25	246	390	140	7.0	12	.3
		1966	1,280	9.1	27	11	14	50	70	19	204	317	113	6.9	11	.1
		1967	2,420	−1.0	−1.0	−1.0	18	59	74	23	−10	343	127	7.1	11	−.1
		1968	2,080	−1.0	30	12	−1.0	60	68	21	−10	336	124	7.1	11	−.1
		1969	2,280	−1.0	47	15	−1.0	67	109	33	−10	493	178	7.9	13	−.1
		1970	1,950	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	380	−10	7.6	13	−.1
		1971	2,300	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	329	−10	7.3	10	−.1
		1972	3,420	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	321	−10	7.4	−1.0	−.1
4	01491000	1965	69	15	8.5	2.0	5.7	15	19	8.1	83	100	30	6.3	2.0	.2
		1966	27	−1.0	−1.0	−1.0	−1.0	22	22	9.8	−10	124	40	6.7	2.8	−.1
		1967	143	−1.0	−1.0	−1.0	−1.0	14	21	8.2	−10	102	32	6.5	3.2	−.1
		1968	171	10	6.4	1.9	3.5	11	15	5.5	53	82	24	6.6	2.7	.1
		1969	81	−1.0	9.8	2.5	−1.0	18	20	11	−10	117	36	7.1	4.1	−.1
		1970	163	12	7.5	2.2	4.3	9	18	8.0	62	95	28	6.2	3.2	.2
		1971	99	14	8.1	2.5	5.6	9	21	9.6	71	105	31	6.3	3.4	.2
		1972	137	15	6.6	2.1	5.3	11	14	8.5	−10	88	25	6.8	−1.0	.1
5	01673000	1945	482	15	4.8	2.2	4.6	26	5.7	2.5	54	−10	21	−.1	.3	−.1
		1946	1,220	13	4.0	1.9	3.4	17	7.2	2.5	47	−10	18	6.5	.3	.1
		1952	1,100	14	4.1	1.6	4.8	16	8.7	2.9	−10	52	17	7.1	.8	−.1
		1953	179	18	4.7	2.3	4.5	28	7.8	2.4	58	63	21	7.1	.1	.1

		1955	25	13	6.6	2.6	5.7	39	5.0	4.2	60	88	27	7.4	.3	.1
		1956	1,030	12	4.0	1.6	3.5	15	7.5	3.7	48	61	17	7.2	1.2	.1
		1968	659	7.7	3.9	1.6	2.6	12	8.0	3.7	55	52	16	6.5	1.4	.0
		1970	657	12	6.0	2.3	4.4	23	10	4.5	54	72	24	6.8	1.1	.1
		1971	1,120	12	4.8	2.2	4.3	18	10	4.1	51	70	21	6.7	1.2	.1
6	02083500	1945	3,403	13	4.2	1.6	5.6	22	4.1	4.0	54	−10	17	−.1	.6	.0
		1954	2,229	13	4.7	1.3	8.2	21	6.5	6.7	62	80	17	−.1	1.2	.1
		1962	2,350	12	4.3	1.6	5.3	18	6.1	5.7	56	65	17	6.8	1.1	.1
		1963	1,780	12	4.6	1.6	6.4	20	6.2	6.6	58	71	18	6.7	.0	.1
		1964	1,930	12	4.6	1.4	6.0	17	7.8	6.5	65	69	17	7.0	1.3	.1
		1965	2,690	12	4.9	1.4	5.2	20	6.4	6.1	60	64	18	6.6	1.3	.1
		1966	1,460	12	5.3	1.4	5.7	19	5.6	7.1	61	72	19	7.0	1.1	.2
		1967	1,150	−1.0	5.9	1.6	6.6	19	7.7	8.0	−10	80	22	6.7	−1.0	−.1
		1968	2,040	9.6	4.0	1.5	3.4	15	6.6	5.0	41	60	16	6.2	1.1	.2
		1970	590	14	5.8	1.8	7.8	25	6.4	9.0	69	84	21	6.6	1.4	.1
		1972	387	13	7.0	2.0	7.2	28	9.4	7.4	64	89	26	6.2	−1.0	.1
7	02129000	1947	6,091	9.9	4.3	1.8	6.6	24	4.8	4.6	50	−10	18	−.1	.9	.1
		1948	9,735	10	4.1	1.7	5.5	22	4.6	3.9	46	−10	17	−.1	.9	.2
		1962	8,520	11	4.6	1.5	6.4	25	5.3	4.7	54	72	18	7.2	1.6	.1
		1963	7,300	13	5.4	1.8	7.4	28	5.8	5.9	60	82	21	7.1	2.2	.1
		1964	7,470	11	4.9	1.7	7.2	26	6.1	6.3	59	79	20	7.1	2.1	.1
		1965	10,200	11	4.9	1.7	6.7	25	5.7	6.0	59	74	19	7.1	1.9	.1
		1966	5,730	11	5.5	1.5	8.9	28	6.0	7.9	64	87	20	7.0	1.7	.1
		1967	4,380	−1.0	5.4	1.8	11	31	7.3	8.8	−10	98	21	6.6	−1.0	−.1
		1969	5,670	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	82	−10	6.5	−1.0	−.1
		1970	8,130	10	4.2	2.1	8.3	25	8.2	6.7	57	80	19	6.5	1.8	.1
		1971	11,400	10	3.6	1.8	7.9	24	5.0	7.2	51	80	17	6.3	1.5	.2
		1972	14,200	9.8	4.5	3.6	5.6	23	6.6	5.8	52	73	22	6.2	−1.0	.2
8	02252500	1955	21	13	61	12	−1.0	162	41	91	346	623	203	7.5	.3	−.1
		1956	10	9.9	72	12	−1.0	184	46	102	388	691	228	7.7	.4	−.1
		1957	31	9.4	59	11	−1.0	158	42	85	332	596	191	7.6	.1	−.1
		1958	14	8.2	60	9.6	43	156	41	78	317	573	188	7.8	.1	−.1
		1959	126	5.7	26	5.1	18	62	27	34	151	274	86	7.0	.5	−.1
		1960	119	8.3	40	8.5	30	106	33	60	236	432	135	7.4	.1	−.1
		1961	16	7.6	68	18	76	162	55	154	464	850	244	7.5	.2	−.1
		1963	8.4	8.4	64	14	56	169	40	105	522	643	217	7.5	.1	−.1
		1964	36	7.8	49	11	44	111	68	88	−10	591	168	7.3	.1	−.1
		1966	10	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	−10	−10	−.1	−1.0	−.1
		1967	15	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	906	−10	−.1	−1.0	−.1
		1968	137	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	372	−10	−.1	−1.0	−.1

Appendix F.—Annual data on streamflow chemical quality—Continued

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
8	02252500	1969	32	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	668	−10	−0.1	−1.0	−0.1
		1970	65	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	1,050	−10	−.1	−1.0	−.1
		1971	24	9.4	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	−10	−10	−.1	.5	−.1
		1972	16	8.6	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	−10	−10	−.1	−1.0	−.1
9	02253000	1955	38	12	62	12	−1.0	158	46	96	357	637	205	7.6	.4	−.1
		1956	37	13	87	21	−1.0	208	73	175	558	997	300	7.6	.1	−.1
		1957	87	11	77	16	−1.0	193	62	136	469	833	260	7.7	.2	−.1
		1958	57	12	90	20	83	220	70	164	547	979	305	7.9	.1	−.1
		1959	64	7.9	68	12	55	163	53	111	395	712	218	7.5	.3	−.1
		1960	310	6.3	36	6.8	24	91	30	47	198	364	117	7.3	.1	−.1
		1961	76	12	87	23	103	197	73	203	602	1,090	305	7.6	.5	−.1
		1962	77	12	88	24	108	184	73	205	610	1,100	316	7.6	.2	−.1
		1963	57	10	94	23	99	221	72	195	608	1,030	329	7.7	.4	−.1
		1964	143	7.9	61	13	54	136	57	107	−10	520	208	7.4	1.9	−.1
		1966	80	9.6	82	29	120	188	79	251	669	1,220	324	7.7	.0	.6
		1967	47	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	1,180	−10	−.1	−1.0	−.1
		1968	212	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	545	−10	−.1	−1.0	−.1
		1969	122	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	889	−10	−.1	−1.0	−.1
		1970	171	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	1,100	−10	−.1	−1.0	−.1
		1971	65	8.2	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	−10	−10	−.1	1.3	−.1
		1972	32	11	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	−10	−10	−.1	−1.0	−.1
10	02253500	1955	43	14	74	18	−1.0	189	59	143	475	858	259	7.5	.3	−.1
		1956	24	12	85	23	−1.0	207	75	184	574	1,030	306	7.9	.1	−.1
		1957	35	8.5	61	12	−1.0	158	46	104	367	665	201	7.7	.1	−.1
		1958	13	8.7	68	11	52	172	48	96	368	666	213	7.8	.1	−.1
		1959	144	4.6	24	3.9	17	54	24	31	134	254	77	6.6	.3	−.1
		1960	125	9.0	49	9.8	40	121	42	79	291	533	162	7.5	.0	−.1
		1961	16	12	77	26	93	192	60	192	581	987	279	7.6	2.0	−.1
		1962	17	8.5	60	15	33	151	43	103	360	635	204	7.8	.0	−.1
		1963	16	11	78	16	72	195	49	142	469	819	261	7.3	.1	−.1
		1964	61	5.5	35	6.9	27	80	34	52	−10	480	117	7.3	4.7	−.1
		1966	91	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	1,390	−10	−.1	−1.0	−.1
		1967	23	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	949	−10	−.1	−1.0	−.1
		1968	145	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	435	−10	−.1	−1.0	−.1
		1969	26	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	856	−10	−.1	−1.0	−.1

		1970	146	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	493	−10	−.1	−1.0	−.1
		1971	39	9.7	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	−10	−10	−.1	1.2	−.1
		1972	25	10	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	−10	−10	−.1	−1.0	−.1
11	02256500	1962	250	3.9	4.8	1.9	4.9	15	.1	7.8	32	58	20	6.5	.0	−.1
		1963	53	1.7	5.7	2.5	12	13	4.6	21	55	106	25	6.2	.0	−.1
		1964	662	2.6	9.8	3.0	18.	13	9.9	37	89	74	37	6.3	.8	−.1
		1965	.9	2.8	14	9.5	44	20	22	93	198	360	74	6.5	.0	.4
		1966	87	3.2	6.6	3.5	15	12	5.6	29	70	140	31	6.4	.5	.2
		1967	66	4.0	5.6	3.0	12	15	1.7	23	59	121	26	6.4	.6	.3
		1971	123	3.4	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	164	−10	−.1	.0	−.1
		1972	169	4.7	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	−10	−10	−.1	−1.0	−.1
12	02273200	1965	395	2.0	6.9	3.3	7.7	14	18	12	61	115	30	6.6	2.9	.1
		1966	786	.8	6.1	2.7	7.1	11	14	12	50	96	26	6.3	.5	.3
		1967	8.3	1.7	7.2	2.7	7.1	14	14	13	55	104	29	6.4	.7	.3
		1971	67	1.1	−1.0	-1.0	−1.0	−1.0	−1.0	−1.0	−10	−10	−10	−.1	.0	−.1
		1972	202	.9	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	−10	−10	−.1	−1.0	−.1
13	02277000	1960	3,240	6.1	40	7.1	16	121	21	27	182	329	130	7.8	3.5	−.1
		1961	2,350	7.8	44	7.0	13	140	16	25	184	334	138	7.5	.3	−.1
		1962	16	6.3	78	13	102	230	35	167	−10	949	251	7.8	.2	−.1
		1963	30	5.9	58	12	88	204	38	141	460	773	191	7.7	.9	−.1
14	02285000	1942	409	13	78	20	45	285	39	67	409	699	278	−.1	1.4	.4
		1964	534	8.1	82	6.7	35	255	16	51	327	565	233	7.7	1.0	.4
		1967	379	10	74	9.6	50	267	8.0	72	351	636	223	7.7	2.4	.4
15	02296750	1959	2,750	6.5	11	2.4	6.3	21	15	3.6	64	110	36	6.6	.9	.6
		1961	671	11	26	5.6	11	34	48	14	145	230	88	6.8	1.4	1.3
		1962	1,240	7.4	13	4.0	7.9	23	22	11	83	135	49	7.0	.1	1.1
		1963	900	8.6	19	6.4	11	30	34	14	125	183	74	7.1	.7	1.7
		1964	977	8.7	19	7.0	11	35	37	15	125	200	76	7.1	.7	1.4
		1966	1,190	7.5	17	6.0	10	34	31	14	113	179	67	7.0	.8	1.1
		1967	560	9.1	23	8.4	12	46	51	14	152	243	94	7.1	.0	1.3
		1971	384	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	−10	−10	−.1	2.9	−.1
		1972	1,030	5.7	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	−10	−10	−.1	−1.0	−.1
16	02313000	1950	1,460	7.3	44	4.2	4.6	118	27	7.1	155	269	123	7.1	1.5	.1
		1951	1,122	7.6	44	3.8	5.0	118	23	10	174	259	124	7.5	.1	.7
		1959	2,210	5.3	36	1.7	4.2	100	12	7.3	116	204	97	7.4	.2	.2
		1960	3,790	3.3	25	2.3	3.6	76	6.8	6.8	86	150	72	7.1	.2	.2
		1961	1,950	5.4	35	2.6	3.7	101	12	7.1	116	208	98	7.4	.3	.2

Appendix F.—*Annual data on streamflow chemical quality*—Continued

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
16	02313000	1962	458	6.7	55	5.3	5.0	134	39	9.0	186	321	158	7.7	0.4	0.2
		1963	400	5.9	50	4.6	4.4	142	21	9.0	165	284	144	7.4	.1	.0
		1964	1,960	4.8	35	2.7	4.4	81	23	7.4	118	201	100	7.2	.2	.2
		1966	951	6.4	47	3.8	4.9	132	16	7.0	151	250	133	7.4	.5	.2
17	02320500	1954	4,400	10	34	6.8	4.0	121	13	5.9	153	233	112	7.7	.6	.1
		1955	1,950	11	42	9.9	4.7	154	20	7.7	191	298	146	7.6	.6	.2
		1956	2,990	9.7	34	6.6	4.5	117	13	7.0	156	225	111	7.4	.6	.3
		1957	4,160	7.6	25	5.5	3.7	90	11	6.5	134	176	86	7.2	.1	.2
		1960	7,620	4.8	30	4.0	3.5	98	8.8	10	131	187	91	7.4	.3	.2
		1961	6,240	6.5	27	4.2	3.4	90	10	5.6	102	172	85	7.1	.4	.3
		1962	4,270	7.6	34	5.9	4.0	116	10	5.8	144	222	104	7.6	.4	.2
		1966	13,500	5.6	31	4.4	3.1	103	7.1	4.5	−10	188	95	7.1	.0	.2
		1967	7,430	6.6	16	3.1	3.7	56	5.8	5.8	71	121	54	6.9	.0	.3
		1972	6,580	6.3	−1.0	−1.0	−1.0	−10	−10	−10	−10	−10	−10	−.1	−1.0	−.1
18	02321500	1957	332	11	6.5	3.3	7.9	24	8.6	9.8	123	92	30	6.3	.4	.4
		1958	414	7.1	5.4	2.7	6.6	18	7.2	11	101	82	25	6.3	.3	.2
		1959	953	5.2	4.6	1.9	4.3	11	5.3	8.1	76	58	19	6.0	.4	.2
		1960	735	5.7	4.5	1.6	4.9	15	3.9	6.7	78	60	18	6.4	.5	.2
		1966	2,690	3.1	3.5	1.3	2.6	9	3.4	4.0	−10	42	14	6.0	1.5	.2
		1971	359	5.0	7.9	2.7	5.6	18	8.4	11	101	90	31	6.5	.3	.3
		1972	475	5.0	−1.0	−1.0	−1.0	−10	−10	−10	−10	−10	−10	−.1	−1.0	−.1
19	02489500	1963	3,430	7.4	3.8	1.1	6.4	8	8.5	9.3	43	70	14	6.3	.8	.2
		1964	7,380	8.1	3.8	1.0	5.2	10	8.0	6.2	41	63	14	6.3	1.2	.1
		1965	8,420	8.4	3.7	1.2	5.6	9	7.2	8.2	45	64	14	6.2	1.1	.1
		1966	10,200	7.5	4.4	.8	4.7	12	6.4	7.0	46	57	14	6.5	.3	.1
		1967	4,310	7.3	3.8	.9	6.0	9	8.4	8.6	52	66	14	6.3	.2	.1
		1968	7,100	8.5	3.9	1.3	5.6	9	9.2	7.2	41	64	15	6.0	.3	.0
		1969	4,110	6.8	4.1	1.4	7.2	15	11	6.7	47	77	16	6.3	.5	.1
		1970	4,950	6.9	4.9	.8	7.0	9	13	7.6	49	78	16	6.4	.9	.2
20	03049655	1963	4,170	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	491	−10	−.1	−1.0	−.1
		1964	18,900	−1.0	−1.0	−1.0	−1.0	−1.0	74	−1.0	−10	237	−10	5.9	−1.0	−.1
		1965	16,900	−1.0	−1.0	−1.0	−1.0	−1.0	79	−1.0	−10	251	−10	5.9	−1.0	−.1
		1971	22,100	−1.0	21	6.2	−1.0	−1.0	−1.0	−1.0	−10	243	78	6.5	−1.0	−.1

21	03251500	1953	2,179	9.0	26	5.2	3.3	86	17	4.1	115	190	86	–.1	2.2	.1
		1954	780	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	116	–10	–10	–.1	–1.0	–.1
		1960	2,360	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	138	218	96	–.1	–1.0	–.1
		1961	4,800	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	113	183	83	–.1	–1.0	–.1
		1962	3,530	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	112	172	75	–.1	–1.0	–.1
		1963	2,490	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	129	208	–10	–.1	–1.0	–.1
		1964	2,250	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	122	194	–10	–.1	–1.0	–.1
		1965	3,800	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	115	180	–10	–.1	–1.0	–.1
		1968	5,610	–1.0	–1.0	–1.0	–1.0	77	19	3.7	118	181	83	7.4	3.1	–.1
		1969	2,060	–1.0	–1.0	–1.0	–1.0	100	26	7.4	159	242	106	7.5	2.7	–.1
		1971	5,560	–1.0	–1.0	–1.0	–1.0	70	23	4.6	113	177	76	7.6	3.8	–.1
		1972	4,580	–1.0	–1.0	–1.0	–1.0	79	23	6.5	122	183	89	7.8	3.7	
22	03276600	1960	–1.0	7.7	80	30	21	255	105	27	427	684	323	–.1	13	.4
		1961	–1.0	7.0	81	28	26	243	110	33	439	704	319	–.1	15	.4
		1962	–1.0	6.9	77	28	21	240	97	30	410	659	305	–.1	13	.4
		1963	–1.0	–1.0	–1.0	–1.0	–1.0	243	120	42	463	739	325	7.5	13	.5
		1964	–1.0	–1.0	–1.0	–1.0	–1.0	231	134	50	492	796	333	7.3	17	.6
		1965	–1.0	–1.0	–1.0	–1.0	–1.0	221	118	42	453	713	318	8.0	15	.4
		1967	–1.0	–1.0	–1.0	–1.0	–1.0	248	110	37	461	715	333	7.7	14	.4
		1968	–1.0	–1.0	–1.0	–1.0	–1.0	220	103	35	423	680	300	7.9	15	.4
		1969	–1.0	–1.0	–1.0	–1.0	–1.0	248	85	32	–10	663	304	7.8	–1.0	.4
		1970	–1.0	–1.0	–1.0	–1.0	–1.0	250	89	43	420	700	307	8.0	13	.4
		1971	–1.0	–1.0	–1.0	–1.0	–1.0	246	91	47	426	704	302	8.0	15	.5
		1972	–1.0	–1.0	–1.0	–1.0	–1.0	256	82	47	447	704	311	8.0	19	.5
23	03277200	1960	–1.0	6.3	38	9.9	19	–1.0	–1.0	–1.0	–10	–10	–10	–.1	–1.0	–.1
		1961	–1.0	5.0	40	10	21	70	93	29	250	410	144	–.1	4.9	.3
		1962	–1.0	4.8	38	9.8	21	61	86	30	237	390	136	–.1	5.4	.3
		1963	–1.0	–1.0	–1.0	–1.0	–1.0	52	89	31	234	393	132	–.1	5.3	.2
		1964	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	113	–1.0	–10	475	–10	7.2	–1.0	–.1
		1965	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	90	–1.0	–10	430	–10	–.1	–1.0	–.1
24	05054000	1956	443	12	43	29	11	234	–1.0	3.8	282	466	225	–.1	2.2	.1
		1957	492	13	53	34	19	232	113	5.1	376	576	272	–.1	1.0	[illegible]
		1958	429	11	54	36	21	253	109	6.8	384	603	283	–.1	5.0	[illegible]
		1959	320	–1.0	–1.0	–1.0	11	252	–1.0	–1.0	–10	467	229	–.1	–.1	–.
		1960	442	–1.0	–1.0	–1.0	12	229	63	–1.0	299	478	229	–.1	–1.0	–.
		1961	213	–1.0	–1.0	–1.0	12	257	48	–1.0	298	495	241	7.6	–1.0	–.
		1962	1,756	–1.0	–1.0	–1.0	15	190	91	–1.0	319	485	217	7.4	–1.0	–.
		1963	567	–1.0	–1.0	–1.0	20	247	115	–1.0	399	604	286	7.4	–1.0	–.
		1964	390	–1.0	–1.0	–1.0	17	240	92	–1.0	356	560	263	7.3	–1.0	–.
		1965	995	–1.0	–1.0	–1.0	17	197	103	–1.0	347	533	246	7.5	–1.0	–

Appendix F.—*Annual data on streamflow chemical quality*—Continued

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
24	05054000	1966	1,268	−1.0	−1.0	−1.0	16	211	95	−1.0	337	522	243	7.7	−1.0	−0.1
		1967	881	−1.0	−1.0	−1.0	19	232	97	−1.0	353	554	259	7.5	−1.0	−.1
		1968	315	−1.0	−1.0	−1.0	16	259	64	−1.0	325	525	255	7.7	−1.0	−.1
		1969	1,470	−1.0	−1.0	−1.0	14	188	−1.0	−1.0	290	444	202	7.5	−1.0	−.1
		1970	383	−1.0	−1.0	−1.0	17	239	−1.0	−1.0	327	509	244	7.7	−1.0	−.1
		1971	303	−1.0	−1.0	−1.0	14	234	−1.0	−1.0	296	475	233	7.7	−1.0	−.1
		1972	1,200	−1.0	50	30	17	214	−1.0	−1.0	373	539	246	7.4	−1.0	−.1
25	05082500	1957	2,374	15	59	25	14	222	87	5.5	342	521	251	−.1	1.6	.2
		1958	1,860	14	62	28	18	256	86	8.0	365	568	269	−.1	1.2	.2
		1959	4,072	−1.0	−1.0	−1.0	17	259	−1.0	−1.0	−10	558	264	−.1	−1.0	−.1
		1960	1,675	−1.0	−1.0	−1.0	16	227	75	−1.0	336	514	239	−.1	−1.0	−.1
		1961	763	−1.0	−1.0	−1.0	20	274	74	−1.0	367	584	272	7.6	−1.0	−.1
		1962	5,404	−1.0	−1.0	−1.0	13	207	76	−1.0	318	481	228	7.5	−1.0	−.1
		1963	2,541	−1.0	−1.0	−1.0	15	237	74	−1.0	336	520	249	7.4	−1.0	−.1
		1964	2,013	−1.0	−1.0	−1.0	16	231	88	−1.0	358	547	258	7.7	−1.0	−.1
		1965	4,604	−1.0	−1.0	−1.0	14	197	50	−1.0	321	483	225	7.2	−1.0	−.1
		1966	6,050	−1.0	−1.0	−1.0	13	199	74	−1.0	306	472	220	7.6	−1.0	−.1
		1967	4,067	−1.0	−1.0	−1.0	17	214	86	−1.0	334	516	243	7.7	−1.0	−.1
		1968	1,840	−1.0	−1.0	−1.0	18	235	82	−1.0	352	536	254	7.7	−1.0	−.1
		1969	5,100	−1.0	−1.0	−1.0	14	199	76	−1.0	296	454	212	7.6	−1.0	−.1
		1970	3,910	−1.0	−1.0	−1.0	16	215	−1.0	−1.0	324	493	235	7.5	−1.0	−.1
		1971	2,100	−1.0	−1.0	−1.0	18	232	−1.0	−1.0	313	490	232	7.6	−1.0	−.1
		1972	5,130	−1.0	53	24	14	219	−1.0	−1.0	352	507	230	7.7	−1.0	−.1
26	05124000	1955	635	7.1	43	31	62	283	129	11	459	697	231	−.1	2.6	.2
		1956	623	−1.0	46	28	52	257	128	8.9	427	661	229	−.1	2.0	−.1
		1957	78	−1.0	52	39	80	347	154	18	566	859	289	−.1	5.5	−.1
		1958	38	−1.0	56	48	106	383	209	28	697	1,040	335	−.1	5.7	−.1
		1959	13	−1.0	−1.0	−1.0	150	361	−1.0	−1.0	−10	1,240	335	−.1	−1.0	−.1
		1960	264	−1.0	−1.0	−1.0	52	253	97	14	398	602	203	7.3	−1.0	−.1
		1961	10	−1.0	−1.0	−1.0	169	490	175	−1.0	814	1,180	275	7.4	−1.0	−.1
		1962	6.1	−1.0	−1.0	−1.0	147	289	387	−1.0	921	1,310	382	7.2	−1.0	−.1
		1963	42	−1.0	−1.0	−1.0	107	303	27	−1.0	687	992	287	7.4	−1.0	−.1
		1964	58	−1.0	−1.0	−1.0	105	332	150	−1.0	660	909	249	7.5	−1.0	−.1
		1967	124	7.8	43	33	91	275	183	22	558	842	240	7.6	4.0	.3
		1968	46	20	40	37	115	367	176	31	669	978	252	7.9	5.0	.4

		1969	1,370	7.8	32	17	[illegible]	193	67	10	298	457	147	7.8	[illegible]	.3
		1970	538	7.5	49	30	71	289	139	18	504	747	246	8.1	.4	.2
		1971	283	4.7	47	31	77	296	158	19	575	787	244	8.1	−1.0	−.1
27	06185500	1966	11,920	−1.0	−1.0	−1.0	50	190	166	10	423	650	226	7.7	−1.0	−.1
		1967	12,390	−1.0	−1.0	−1.0	50	191	155	−1.0	409	621	216	7.9	−1.0	−.1
		1968	10,900	−1.0	−1.0	−1.0	49	197	168	−1.0	427	655	239	8.1	−1.0	−.1
		1969	13,400	−1.0	−1.0	−1.0	51	199	166	−1.0	420	648	233	7.9	−1.0	−.1
		1970	11,700	−1.0	−1.0	−1.0	51	199	172	−1.0	441	653	237	8.1	−1.0	−.1
		1971	13,000	−1.0	55	22	52	194	167	8.8	435	652	231	7.2	−1.0	.7
		1972	11,300	7.4	53	21	49	197	160	8.2	405	632	219	8.2	−1.0	.7
28	06214500	1951	9,040	14	26	8.4	15	100	38	4.4	167	255	92	−.1	1.6	.3
		1952	8,135	−1.0	28	7.5	17	108	44	4.6	177	272	101	−.1	1.8	−.1
		1953	6,012	−1.0	29	8.8	19	111	50	5.0	190	298	109	−.1	1.3	−.1
		1954	6,319	−1.0	−1.0	−1.0	19	105	47	−1.0	184	283	101	−.1	−1.0	−.1
		1955	5,351	−1.0	−1.0	−1.0	21	119	57	−1.0	206	320	114	−.1	−1.0	−.1
		1956	8,074	−1.0	−1.0	−1.0	15	108	−1.0	−1.0	170	271	101	−.1	−1.0	−.1
		1957	8,467	−1.0	−1.0	−1.0	16	115	−1.0	−1.0	177	285	107	−.1	−1.0	−.1
		1958	5,976	−1.0	−1.0	−1.0	19	119	−1.0	−1.0	200	314	116	−.1	−1.0	−.1
		1964	8,430	13	28	8.1	18	107	49	3.3	171	282	104	7.2	.3	.5
		1965	9,273	13	26	7.9	15	103	38	3.8	171	256	97	7.1	.3	.4
		1966	5,942	−1.0	33	11	18	118	50	−1.0	192	306	113	7.4	.4	−.1
		1967	9,351	−1.0	−1.0	−1.0	15	110	36	−1.0	160	263	103	7.4	−1.0	−.1
		1968	8,620	−1.0	−1.0	−1.0	15	112	38	−1.0	167	266	104	7.7	−1.0	−.1
		1969	7,650	−1.0	−1.0	−1.0	16	113	42	−1.0	176	274	104	7.7	−1.0	−.1
		1970	4,010	−1.0	−1.0	−1.0	27	162	74	−1.0	275	421	161	8.0	−1.0	−.1
		1971	8,770	14	24	7.8	15	107	36	4.0	157	251	92	7.9	−1.0	.5
		1972	9,290	13	24	7.5	14	99	38	3.5	153	242	91	7.5	−1.0	.3
29	06294700	1951	5,862	17	60	18	63	161	210	9.2	491	703	224	−.1	3.2	.3
		1952	3,223	−1.0	74	27	89	190	307	13	666	919	296	−.1	5.1	−.1
		1953	2,846	−1.0	86	30	102	209	357	15	739	1,040	338	−.1	2.4	−.1
		1954	2,739	−1.0	−1.0	−1.0	105	213	359	−1.0	745	1,050	340	−.1	−1.0	−.1
		1955	3,008	−1.0	−1.0	−1.0	102	215	362	−1.0	742	1,040	338	−.1	−1.0	−.1
		1956	3,172	−1.0	−1.0	−1.0	97	214	−1.0	−1.0	720	1,010	328	−.1	−1.0	−.1
		1957	4,744	−1.0	−1.0	−1.0	76	200	−1.0	−1.0	586	840	279	−.1	−1.0	−.1
		1958	3,886	−1.0	−1.0	−1.0	84	200	−1.0	−1.0	630	898	298	−.1	−1.0	−.1
		1959	2,898	−1.0	−1.0	−1.0	103	221	−1.0	−1.0	757	1,060	352	−.1	−1.0	−.1
		1960	2,224	−1.0	−1.0	−1.0	118	232	−1.0	−1.0	816	1,130	376	7.6	−1.0	−.1
		1961	1,623	−1.0	−1.0	−1.0	140	244	495	−1.0	966	1,310	433	7.9	−1.0	−.1
		1962	4,029	−1.0	−1.0	−1.0	90	205	303	−1.0	662	937	313	7.4	−1.0	−.1
		1963	4,144	−1.0	−1.0	−1.0	82	202	282	−1.0	625	890	299	7.5	−1.0	−.1

Appendix F.—*Annual data on streamflow chemical quality*—Continued

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
29	06294700	1964	4,680	−1.0	−1.0	−1.0	82	200	276	−1.0	611	878	295	7.7	−1.0	−0.1
		1965	5,480	−1.0	−1.0	−1.0	71	196	245	−1.0	558	792	275	7.4	−1.0	−.1
		1966	1,712	−1.0	−1.0	−1.0	87	219	306	−1.0	673	961	328	7.7	−1.0	−.1
		1967	4,397	−1.0	−1.0	−1.0	91	197	297	−1.0	640	911	304	7.7	−1.0	−.1
		1968	4,630	−1.0	−1.0	−1.0	80	204	265	−1.0	596	855	287	7.9	−1.0	−.1
		1969	3,970	−1.0	−1.0	−1.0	84	214	289	−1.0	629	894	310	7.9	−1.0	−.1
		1970	3,610	−1.0	−1.0	−1.0	100	216	327	−1.0	710	966	328	8.0	−1.0	−.1
		1971	5,270	9.0	72	26	74	202	258	9.6	553	828	286	7.9	−1.0	.5
		1972	4,860	9.3	70	24	73	192	257	9.9	545	828	274	8.0	−1.0	.4
30	06308500	1951	358	13	54	28	44	221	160	2.5	431	638	250	−.1	1.9	.3
		1952	496	−1.0	48	27	38	201	147	2.7	390	592	231	−.1	2.2	−.1
		1953	324	−1.0	54	32	47	227	170	2.8	444	674	266	−.1	1.5	−.1
		1954	212	−1.0	−1.0	−1.0	60	267	213	−1.0	301	536	311	−.1	−1.0	−.1
		1955	343	−1.0	−1.0	−1.0	47	224	174	−1.0	448	674	259	−.1	−1.0	−.1
		1956	330	−1.0	−1.0	−1.0	41	224	−1.0	−1.0	442	670	269	−.1	−1.0	−.1
		1957	413	−1.0	−1.0	−1.0	38	215	−1.0	−1.0	388	591	237	−.1	−1.0	−.1
		1958	268	−1.0	−1.0	−1.0	51	244	−1.0	−1.0	475	716	283	−.1	−1.0	−.1
		1959	382	−1.0	−1.0	−1.0	52	250	−1.0	−1.0	490	742	292	−.1	−1.0	−.1
		1960	188	−1.0	−1.0	−1.0	55	275	−1.0	−1.0	534	788	318	−.1	−1.0	−.1
		1961	572	−1.0	−1.0	−1.0	82	320	287	−1.0	685	1,000	381	7.9	−1.0	−.1
		1962	467	−1.0	−1.0	−1.0	39	213	138	−1.0	397	608	242	7.4	−1.0	−.1
		1963	596	−1.0	−1.0	−1.0	36	199	130	−1.0	370	564	223	7.5	−1.0	−.1
		1964	490	−1.0	−1.0	−1.0	36	202	134	−1.0	376	573	234	7.7	−1.0	−.1
		1965	601	−1.0	−1.0	−1.0	43	255	169	−1.0	452	669	271	7.4	−1.0	−.1
		1966	215	−1.0	−1.0	−1.0	63	285	239	−1.0	599	881	354	7.9	−1.0	−.1
		1967	582	−1.0	−1.0	−1.0	45	213	158	−1.0	411	635	254	7.7	−1.0	−.1
		1968	658	−1.0	−1.0	−1.0	43	222	155	−1.0	518	632	254	7.9	−1.0	−.1
		1969	603	−1.0	−1.0	−1.0	50	234	178	−1.0	457	687	264	7.9	−1.0	−.1
		1970	233	−1.0	−1.0	−1.0	76	318	276	−1.0	680	954	390	8.2	−1.0	−.1
		1971	570	7.6	59	38	56	239	217	4.6	507	770	305	8.0	−1.0	.4
		1972	418	7.1	64	44	74	273	265	4.3	600	908	342	8.0	−1.0	.3
31	06329500	1951	15,340	14	47	14	43	147	134	7.5	352	522	175	−.1	2.8	.3
		1952	13,070	−1.0	48	16	47	155	148	7.5	371	561	186	−.1	2.7	−.1
		1953	9,451	−1.0	55	19	60	165	192	8.9	448	665	215	−.1	2.0	−.1
		1954	9,336	−1.0	−1.0	−1.0	60	167	187	−1.0	445	654	212	−.1	−1.0	−.1

		1955	8,986	−1.0	−1.0	−1.0	66	[illegible]	215	−1.0	491	722	233	−.1	−1.0	[illegible]
		1956	11,850	−1.0	−1.0	−1.0	49	165	−1.0	−1.0	402	603	202	−.1	−1.0	−.1
		1957	13,730	−1.0	−1.0	−1.0	48	171	−1.0	−1.0	389	591	202	−.1	−1.0	−.1
		1958	10,190	−1.0	−1.0	−1.0	58	175	−1.0	−1.0	448	668	224	−.1	−1.0	−.1
		1959	10,730	−1.0	−1.0	−1.0	53	177	−1.0	−1.0	425	636	215	−.1	−1.0	−.1
		1960	7,591	−1.0	−1.0	−1.0	60	190	−1.0	−1.0	470	696	234	7.4	−1.0	−.1
		1961	5,884	−1.0	−1.0	−1.0	72	192	224	−1.0	515	760	247	7.7	−1.0	−.1
		1962	14,440	−1.0	−1.0	−1.0	57	175	193	−1.0	458	672	233	7.4	−1.0	−.1
		1963	13,320	−1.0	−1.0	−1.0	56	174	172	−1.0	429	642	215	7.5	−1.0	−.1
		1964	13,500	−1.0	−1.0	−1.0	50	159	164	−1.0	403	603	204	7.6	−1.0	−.1
		1965	17,350	−1.0	−1.0	−1.0	49	158	151	−1.0	382	574	188	7.4	−1.0	−.1
		1966	8,108	−1.0	−1.0	−1.0	58	180	178	−1.0	439	663	218	7.8	−1.0	−.1
		1967	15,410	−1.0	−1.0	−1.0	53	179	165	−1.0	427	632	215	7.8	−1.0	−.1
		1968	15,000	−1.0	−1.0	−1.0	52	168	161	−1.0	404	608	203	7.9	−1.0	−.1
		1969	13,300	−1.0	−1.0	−1.0	56	176	170	−1.0	414	626	205	7.9	−1.0	−.1
		1970	9,620	−1.0	−1.0	−1.0	74	219	212	−1.0	535	789	261	7.8	−1.0	−.1
		1971	16,000	11	43	16	46	150	137	7.8	352	528	173	7.9	−1.0	.4
		1972	14,700	11	48	19	57	170	176	10	428	636	196	7.9	−1.0	.4
32	06478500	1960	728	−1.0	42	13	31	135	104	12	334	503	175	6.8	−1.0	−.1
		1961	72	−1.0	101	35	76	216	314	39	773	1,070	408	7.3	−1.0	−.1
		1962	2,310	−1.0	46	15	29	155	103	11	337	513	187	7.3	−1.0	−.1
		1963	222	−1.0	110	53	103	310	376	51	942	1,310	505	7.6	−1.0	−.1
		1964	170	−1.0	107	48	127	295	380	74	956	1,370	463	7.6	−1.0	−.1
		1968	77	12	103	54	153	317	424	85	1,070	1,500	478	7.8	3.6	.5
		1969	405	−1.0	−1.0	−1.0	71	307	196	−1.0	−10	934	347	7.9	3.0	−.1
		1970	264	−1.0	−1.0	−1.0	−1.0	273	308	−1.0	−10	−10	402	7.7	1.7	−.1
33	06807000	1951	60,400	17	57	16	42	187	122	13	384	575	208	−.1	5.1	.4
		1952	58,180	−1.0	58	16	47	189	144	13	415	621	213	−.1	4.7	−.1
		1953	39,370	−1.0	62	18	59	191	177	16	462	697	229	−.1	3.3	−.1
		1954	31,630	−1.0	−1.0	−1.0	56	190	162	−1.0	443	672	223	−.1	−1.0	−.1
		1955	27,450	−1.0	−1.0	−1.0	63	199	186	−1.0	476	725	235	−.1	−1.0	−.1
		1956	27,060	−1.0	−1.0	−1.0	61	187	−1.0	−1.0	461	706	223	−.1	−1.0	−.1
		1957	25,370	−1.0	−1.0	−1.0	54	179	−1.0	−1.0	418	642	207	−.1	−1.0	−.1
		1958	27,810	−1.0	−1.0	−1.0	54	186	−1.0	−1.0	425	647	213	−.1	−1.0	−.1
		1959	27,980	−1.0	−1.0	−1.0	54	197	−1.0	−1.0	433	667	221	−.1	−1.0	−.1
		1960	33,030	−1.0	−1.0	−1.0	41	185	−1.0	−1.0	385	590	209	7.3	−1.0	−.1
		1961	28,190	−1.0	−1.0	−1.0	53	203	−1.0	−1.0	440	678	229	7.5	−1.0	−.1
		1962	32,710	−1.0	−1.0	−1.0	40	195	−1.0	−1.0	394	607	223	7.4	−1.0	−.1
		1963	28,150	−1.0	−1.0	−1.0	64	197	−1.0	−1.0	506	759	250	7.4	−1.0	−.1
		1964	28,550	−1.0	−1.0	−1.0	64	191	−1.0	−1.0	497	730	237	7.3	−1.0	−.1
		1965	33,950	−1.0	−1.0	−1.0	56	196	−1.0	−1.0	447	678	225	7.4	−1.0	−.1

Appendix F.—Annual data on streamflow chemical quality—Continued

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc.	HRD	pH	NO_3	F
33	06807000	1966	34,980	−1.0	−1.0	−1.0	64	207	−1.0	−1.0	487	748	245	7.6	−1.0	−0.1
		1968	33,000	11	64	20	71	201	207	15	510	765	242	7.6	.9	.5
		1969	47,100	12	58	18	49	201	141	14	435	636	215	7.6	3.4	.5
		1970	37,200	−1.0	−1.0	−1.0	−1.0	203	−1.0	−1.0	−10	726	−10	8.0	2.7	−.1
		1971	44,200	−1.0	−1.0	−1.0	−1.0	207	−1.0	−1.0	−10	717	−10	7.8	−1.0	−.1
		1972	45,500	−1.0	−1.0	−1.0	−1.0	199	−1.0	−1.0	−10	747	−10	7.8	−1.0	−.1
34	06877600	1956	293	16	78	16	198	208	129	280	858	1,450	260	7.7	2.9	.4
		1957	2,193	13	54	12	57	168	64	79	390	652	185	7.5	2.9	.4
		1958	2,290	12	86	15	82	192	134	117	581	929	275	7.3	4.0	.4
		1962	2,558	−1.0	100	19	105	218	161	147	678	1,130	327	−.1	−1.0	−.1
		1963	848	−1.0	122	29	205	253	238	285	1,020	1,730	411	−.1	−1.0	−.1
		1964	449	−1.0	101	23	229	223	204	318	1,010	1,700	342	−.1	−1.0	−.1
		1965	1,223	−1.0	69	11	81	176	91	110	479	775	215	−.1	−1.0	−.1
		1966	527	−1.0	100	20	172	224	171	243	858	1,400	331	−.1	−1.0	−.1
		1967	1,065	−1.0	64	8.0	−1.0	173	62	89	405	667	193	−.1	−1.0	−.1
		1968	549	−1.0	111	23	214	244	198	305	1,020	1,690	370	−.1	−1.0	−.1
		1969	2,180	9.5	63	9.9	50	163	74	70	384	609	198	7.6	2.9	.4
		1970	808	11	79	12	107	180	108	162	598	988	248	7.4	3.2	.4
35	06887000	1956	567	21	40	7.8	22	159	26	19	235	371	132	7.6	2.4	.3
		1957	1,247	15	30	6.1	12	116	20	11	174	263	100	7.4	4.9	.4
		1958	2,437	13	34	7.3	10	126	23	7.9	181	284	115	7.1	6.0	.4
		1962	2,990	12	51	13	18	181	42	11	242	404	180	7.7	3.6	.3
		1963	1,280	4.8	56	13	20	214	43	18	267	467	193	7.9	1.5	.3
		1964	1,660	5.5	47	8.2	19	172	33	18	230	376	150	7.5	1.6	.4
		1965	3,380	12	31	6.2	9.8	124	18	8.9	165	251	102	7.5	3.4	.4
		1966	1,130	13	42	9.6	12	156	28	11	199	323	144	8.1	4.5	.3
		1967	613	7.1	42	8.4	16	153	30	14	215	337	138	7.8	5.6	.3
		1968	2,380	11	46	9.9	16	168	34	15	233	372	156	7.7	3.5	.4
		1969	4,430	12	43	8.5	10	147	28	12	212	322	142	7.5	4.7	.4
		1970	512	12	55	11	17	189	40	17	267	421	180	7.6	2.3	.4
		1971	2,220	14	49	9.8	16	166	38	17	250	392	163	7.6	4.3	.4
36	06892500	1962	11,710	−1.0	68	14	35	205	69	42	361	600	225	−.1	−1.0	−.1
		1963	3,700	−1.0	79	18	75	241	104	85	495	835	273	−.1	−1.0	−.1
		1964	2,140	−1.0	75	17	83	223	100	98	500	834	255	−.1	−1.0	−.1

		1965	[illegible]	10	48	8.1	18	159	33	19	236	364	152	7.6	5.3	[illegible]
		1966	4,020	12	69	14	41	221	75	48	394	615	230	7.7	4.6	.4
		1967	7,660	10	49	5.9	22	156	36	23	250	393	147	7.5	6.0	.4
		1968	6,020	12	60	12	34	199	59	40	327	527	203	7.5	4.1	.4
		1969	11,500	8.6	58	9.8	20	184	47	24	280	451	184	7.6	4.8	.4
		1970	10,700	11	62	10	25	193	51	29	300	483	197	7.4	6.3	.4
		1971	6,050	8.6	67	12	36	199	67	46	356	579	217	7.6	4.5	.4
37	07139500	1962	102	15	211	87	264	244	1,080	92	1,980	2,510	882	8.0	6.5	1.0
		1963	49	14	139	46	127	272	511	47	1,050	1,460	537	7.7	7.0	.8
		1964	77	16	102	28	85	206	333	33	735	999	368	7.3	5.7	.7
		1966	259	14	233	92	290	259	1,220	92	2,080	2,620	960	7.6	7.4	1.0
		1967	134	15	225	84	271	260	1,120	91	2,220	2,560	928	7.6	7.2	1.0
		1969	107	14	212	78	251	235	1,050	84	1,840	2,370	851	7.6	9.0	1.0
		1970	222	12	173	68	215	208	879	71	1,540	1,980	713	7.7	7.3	.8
38	07146500	1952	1,910	−1.0	100	29	243	234	242	316	1,090	1,790	367	7.8	5.3	−.1
		1953	650	−1.0	92	25	305	218	180	443	1,210	2,060	333	7.9	5.4	−.1
		1954	457	−1.0	94	24	340	209	180	497	1,300	2,230	333	7.9	6.8	−.1
		1955	647	−1.0	73	18	213	175	124	344	877	1,530	256	7.6	6.2	−.1
		1956	626	−1.0	77	21	210	182	138	339	935	1,610	278	7.8	7.5	−.1
		1957	2,860	−1.0	55	11	97	155	71	148	493	854	182	8.0	4.7	−.1
		1958	3,260	−1.0	72	17	139	167	144	190	700	1,130	252	8.0	5.2	−.1
		1959	1,690	−1.0	87	24	214	197	181	304	957	1,590	316	8.0	4.5	−.1
		1960	3,230	−1.0	68	19	131	154	140	177	671	1,080	248	8.0	5.2	−.1
		1961	2,650	−1.0	63	16	131	164	92	192	627	1,040	224	7.9	3.6	−.1
		1962	2,800	−1.0	−1.0	−1.0	125	159	106	176	619	1,000	222	8.1	−1.0	−.1
		1963	1,168	−1.0	−1.0	−1.0	188	190	128	275	851	1,400	273	8.3	−1.0	−.1
		1964	798	−1.0	−1.0	−1.0	185	−1.0	108	276	806	1,350	248	−.1	−1.0	−.1
		1965	3,164	−1.0	−1.0	−1.0	106	−1.0	115	140	528	840	177	−.1	−1.0	−.1
		1966	1,173	−1.0	−1.0	−1.0	276	181	400	326	1,320	2,040	438	8.3	4.6	−.1
		1967	1,330	−1.0	−1.0	−1.0	152	130	136	208	695	1,140	213	8.5	4.0	.3
		1968	1,000	−1.0	−1.0	−1.0	212	157	157	303	880	1,490	265	8.2	5.2	−.1
		1969	2,470	−1.0	−1.0	−1.0	141	−1.0	113	199	667	1,100	219	8.3	5.5	−.1
		1970	1,580	−1.0	−1.0	−1.0	206	167	194	276	925	1,500	297	8.3	7.1	−.1
		1971	1,090	−1.0	−1.0	−1.0	195	152	137	275	829	1,390	250	8.4	9.6	−.1
39	07161000	1953	235	−1.0	140	40	1,590	162	331	2,480	4,780	8,020	514	−.1	−1.0	−.1
		1954	305	−1.0	123	31	1,369	170	257	2,100	4,060	6,890	434	−.1	−1.0	−.1
		1955	1,349	−1.0	90	24	644	147	175	1,000	2,070	3,600	323	−.1	−1.0	−.1
		1956	543	−1.0	77	24	559	132	143	886	1,850	3,140	290	−.1	−1.0	−.1
		1957	3,450	−1.0	85	20	403	141	161	629	1,430	2,480	295	−.1	−1.0	−.1
		1958	950	−1.0	134	39	1,100	186	303	1,710	3,530	5,900	495	−.1	−1.0	−.1

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
39	07161000	1959	695	−1.0	115	32	1,040	162	262	1,620	3,250	5,490	418	−0.1	−1.0	−0.1
		1960	2,700	−1.0	104	31	595	158	236	926	2,070	3,460	387	7.9	−1.0	−.1
		1961	1,450	−1.0	99	31	698	157	241	1,070	2,320	3,840	374	8.1	−1.0	−.1
		1962	1,340	−1.0	−1.0	−1.0	723	185	233	1,110	2,410	4,000	385	8.2	−1.0	−.1
		1963	929	−1.0	−1.0	−1.0	952	142	197	1,460	2,920	4,970	360	8.2	−1.0	−.1
		1965	1,730	−1.0	−1.0	−1.0	465	116	122	721	1,490	2,630	234	8.1	4.4	.4
		1966	371	−1.0	−1.0	−1.0	1,840	186	331	2,890	5,580	9,320	571	8.2	3.5	.7
		1967	514	15	−1.0	−1.0	986	135	174	1,510	2,970	5,020	312	8.3	−1.0	−.1
		1968	550	−1.0	−1.0	−1.0	1,260	147	208	1,930	3,750	−10	354	8.4	2.8	−.1
		1969	1,060	−1.0	−1.0	−1.0	962	−1.0	215	1,480	3,010	5,000	324	8.7	−1.0	−.1
		1970	395	−1.0	−1.0	−1.0	1,410	160	273	2,160	4,230	7,050	445	8.4	6.0	−.1
		1971	324	−1.0	−1.0	−1.0	1,090	162	186	1,680	3,260	5,400	341	8.4	5.0	.5
40	07164400	1947	8,069	−1.0	−1.0	−1.0	−1.0	145	166	605	−10	2,370	341	−.1	3.1	−.1
		1950	9,315	−1.0	84	20	329	154	132	523	1,200	2,080	292	−.1	3.7	−.1
		1951	15,620	−1.0	81	20	270	156	139	422	1,070	1,830	284	−.1	3.5	−.1
		1952	5,444	−1.0	111	32	463	203	196	734	1,720	2,940	408	−.1	3.8	−.1
		1953	1,822	−1.0	119	33	666	157	164	1,120	2,300	3,970	432	−.1	3.0	−.1
		1954	1,280	−1.0	125	33	827	156	174	1,370	2,750	4,730	448	−.1	−1.0	−.1
		1955	3,227	−1.0	97	23	560	147	155	902	1,910	3,350	336	−.1	−1.0	−.1
		1956	1,901	−1.0	85	24	417	143	109	699	1,480	2,600	310	−.1	−1.0	−.1
		1957	14,450	−1.0	76	14	246	136	113	392	976	1,700	245	−.1	−1.0	−.1
		1958	7,761	−1.0	89	24	394	170	162	616	1,460	2,470	320	−.1	−1.0	−.1
		1959	3,586	−1.0	75	23	358	152	138	562	1,300	2,210	282	−.1	−1.0	−.1
		1960	14,000	−1.0	80	24	296	155	147	467	1,160	1,950	298	7.9	2.9	−.1
		1961	10,500	−1.0	71	20	300	152	127	463	1,110	1,910	260	8.0	−1.0	−.1
		1962	9,610	−1.0	−1.0	−1.0	255	177	115	394	1,020	1,710	269	8.2	−1.0	−.1
		1963	3,940	−1.0	−1.0	−1.0	406	172	134	631	1,450	2,480	293	8.2	−1.0	−.1
		1964	2,460	−1.0	−1.0	−1.0	407	155	117	642	1,330	2,330	259	8.3	−1.0	−.1
		1965	8,440	9.9	−1.0	−1.0	245	112	92	375	872	1,540	189	8.3	1.3	−.1
		1966	2,610	7.6	−1.0	−1.0	433	133	228	640	1,530	2,800	314	8.3	1.3	−.1
		1967	3,490	7.4	−1.0	−1.0	367	131	129	562	1,270	2,220	237	8.3	1.7	−.1
		1968	4,550	−1.0	−1.0	−1.0	324	133	101	488	1,100	1,960	216	8.2	1.6	−.1
		1969	9,020	−1.0	−1.0	−1.0	241	−1.0	90	370	911	1,600	220	8.2	−1.0	−.1
		1970	8,150	−1.0	−1.0	−1.0	233	146	109	348	893	1,540	228	8.4	3.0	−.1
		1971	2,650	−1.0	−1.0	−1.0	278	144	102	425	981	1,780	229	8.3	2.2	−.1

41	07178600	1948	3,102	−1.0	33	6.1	25	94	15	49	197	333	107	−.1	2.2	−.1
		1949	5,710	−1.0	41	7.5	−.1	116	24	55	256	406	133	−.1	3.6	−.1
		1950	4,235	−1.0	41	7.8	34	122	19	60	269	430	134	−.1	2.2	−.1
		1951	6,493	−1.0	40	7.5	28	126	18	47	244	386	131	−.1	2.7	−.1
		1952	3,640	−1.0	55	11	41	162	37	68	329	545	182	−.1	1.9	−.1
		1953	804	−1.0	42	9.4	65	103	35	114	368	613	144	−.1	4.2	−.1
		1954	875	−1.0	37	5.5	41	91	21	76	279	444	115	−.1	3.8	−.1
		1955	1,208	−1.0	41	7.3	49	97	30	89	298	509	132	−.1	4.5	−.1
		1956	297	−1.0	42	8.8	63	97	25	123	363	630	141	−.1	−1.0	−.1
		1957	7,305	−1.0	31	5.9	21	88	15	41	195	313	102	−.1	3.7	−.1
		1958	3,897	−1.0	52	9.0	36	132	31	72	322	500	166	−.1	4.5	−.1
		1959	3,175	−1.0	39	7.4	39	101	22	73	274	442	128	−.1	3.8	−.1
		1960	6,760	−1.0	48	8.7	32	131	30	60	287	459	156	7.9	3.2	−.1
		1961	9,390	−1.0	35	7.4	22	107	22	38	215	331	118	7.6	2.4	−.1
		1962	5,560	−1.0	−1.0	−1.0	31	153	31	59	293	488	171	8.0	−1.0	−.1
		1963	1,260	−1.0	−1.0	−1.0	55	159	40	105	413	676	209	8.0	−1.0	−.1
		1964	855	−1.0	−1.0	−1.0	52	94	35	94	310	516	136	8.1	−1.0	−.1
		1965	1,465	−1.0	−1.0	−1.0	33	114	25	59	265	425	132	8.1	−1.0	−.1
		1966	788	7.1	−1.0	−1.0	58	139	32	109	379	634	181	8.3	3.3	.3
		1967	2,020	−1.0	−1.0	−1.0	37	95	27	67	265	430	122	8.3	1.9	−.1
		1968	3,750	−1.0	−1.0	−1.0	34	125	35	62	283	468	152	8.0	2.3	−.1
		1969	7,000	−1.0	−1.0	−1.0	24	121	27	39	229	387	135	8.3	−1.0	−.1
		1970	4,940	−1.0	−1.0	−1.0	22	116	25	35	220	354	127	8.3	3.0	−.1
42	07193500	1952	7,489	8.7	41	6.7	10	110	47	9.3	194	306	130	−.1	3.2	−.1
		1953	1,928	4.4	47	7.6	13	134	48	13	210	354	148	−.1	1.7	.1
		1954	1,158	5.0	47	8.6	14	128	49	19	209	357	153	−.1	.5	−.1
		1955	2,890	3.6	44	6.5	13	103	50	16	198	338	136	−.1	4.4	−.1
		1956	1,547	5.5	43	6.5	11	112	46	15	197	325	134	−.1	3.5	.2
		1957	11,500	10	31	4.8	7.9	86	27	9.1	147	229	97	7.9	5.3	.2
		1958	8,611	7.2	38	4.8	9.0	97	34	11	166	263	114	−.1	4.2	.2
		1959	4,279	−1.0	43	4.9	10	100	43	14	184	308	128	−.1	4.8	.3
		1960	10,300	9.6	38	6.6	8.7	95	38	12	187	266	122	7.8	6.5	.3
		1961	13,300	9.3	38	5.9	8.7	103	37	9.4	178	266	116	7.7	2.5	.3
		1962	8,610	−1.0	−1.0	−1.0	10	114	39	9.9	194	295	127	8.0	−1.0	−.1
		1963	3,750	−1.0	44	6.7	11	123	40	11	197	315	137	8.1	−1.0	−.1
		1964	2,320	−1.0	−1.0	−1.0	13	130	59	17	235	375	165	8.0	.9	−.1
		1965	5,360	−1.0	−1.0	−1.0	−1.0	−1.0	42	−1.0	−10	289	−10	−.1	−1.0	−.1
		1966	3,630	−1.0	−1.0	−1.0	−1.0	−1.0	32	−1.0	−10	183	−10	−.1	−1.0	−.1
		1967	5,210	−1.0	−1.0	−1.0	11	115	49	13	191	319	137	7.9	.8	−.1
		1968	10,400	−1.0	−1.0	−1.0	−1.0	107	34	9.6	151	278	117	7.9	1.2	−.1
		1969	11,400	−1.0	−1.0	−1.0	−1.0	−1.0	38	−1.0	−10	284	−10	−.1	−1.0	−.1
		1970	7,020	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	289	−10	−.1	−1.0	−.1

Appendix F.—Annual data on streamflow chemical quality—Continued

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
43	07245000	1947	9,000	−1.0	51	14	130	103	44	248	555	1,010	190	−0.1	2.4	−0.1
		1948	6,400	−1.0	−1.0	−1.0	−1.0	102	29	329	−10	1,250	−10	−.1	3.1	−.1
		1949	7,985	−1.0	71	18	196	123	49	373	801	1,360	251	−.1	3.4	−.1
		1950	9,964	−1.0	61	16	172	113	34	327	731	1,270	218	−.1	2.8	−.1
		1951	4,595	−1.0	95	26	269	146	65	510	1,170	1,940	329	−.1	3.4	−.1
		1953	3,264	−1.0	69	18	262	82	20	516	1,060	1,770	246	−.1	−1.0	−.1
		1954	2,972	−1.0	102	25	377	111	35	742	1,500	2,510	358	−.1	−1.0	−.1
		1955	2,601	−1.0	96	24	349	109	41	678	1,420	2,440	338	−.1	−1.0	−.1
		1956	980	−1.0	126	36	490	123	46	978	1,960	3,280	482	−.1	−1.0	−.1
		1957	11,560	−1.0	42	10	74	113	24	134	397	672	146	−.1	−1.0	−.1
		1958	6,186	−1.0	50	16	102	123	39	190	520	879	191	−.1	4.0	−.1
		1959	4,177	−1.0	39	13	83	108	31	147	416	693	151	−.1	2.2	−.1
		1960	10,300	−1.0	42	14	69	118	38	122	394	653	163	7.9	2.9	−.1
		1961	4,400	−1.0	45	17	82	134	58	134	451	743	182	8.1	1.8	−.1
		1962	4,691	−1.0	−1.0	−1.0	73	131	48	125	416	694	175	7.9	−1.0	−.1
		1963	1,963	−1.0	−1.0	−1.0	84	130	49	145	460	763	180	7.9	−1.0	−.1
		1964	97	−1.0	−1.0	−1.0	139	155	51	243	643	1,110	227	8.2	−1.0	−.1
		1967	1,160	−1.0	−1.0	−1.0	64	124	41	107	354	618	150	7.6	.7	.5
		1968	6,590	−1.0	−1.0	−1.0	44	89	28	75	267	432	108	8.0	1.0	−.1
		1969	6,650	−1.0	−1.0	−1.0	46	90	28	79	280	474	116	8.0	−1.0	−.1
		1970	3,550	−1.0	−1.0	−1.0	47	97	33	77	279	480	122	8.3	.0	−.1
44	07263500	1946	49,240	9.6	38	8.1	71	98	28	124	355	615	130	−.1	1.8	−.1
		1947	47,590	9.0	39	9.0	91	108	47	137	419	726	135	−.1	2.3	−.1
		1948	44,710	6.4	34	7.6	87	97	34	134	382	658	117	−.1	2.4	−.1
		1949	58,420	8.0	45	9.2	89	105	48	145	424	732	151	−.1	3.5	−.1
		1950	58,740	9.0	41	8.7	70	98	35	121	363	619	136	7.7	3.3	−.1
		1951	52,490	11	48	10	82	121	49	135	430	718	161	7.7	3.6	−.1
		1952	38,730	11	34	9.6	79	103	43	131	407	679	147	7.6	3.0	−.1
		1953	24,940	9.0	31	6.5	75	67	22	133	370	590	104	7.6	2.3	−.1
		1954	12,470	5.0	49	12	167	95	38	297	680	1,180	172	7.8	3.2	−.1
		1955	19,150	4.0	42	9.7	124	82	40	213	539	926	145	7.7	2.9	−.1
		1956	10,150	5.0	42	9.9	118	83	36	209	539	902	150	7.8	2.2	−.1
		1957	72,510	6.0	35	6.1	53	93	33	85	293	488	112	7.5	2.3	−.1
		1958	49,540	6.0	38	8.6	64	98	42	102	349	567	130	7.6	2.7	−.1
		1959	28,900	5.7	38	7.8	64	102	41	102	361	572	127	7.4	2.8	−.2
		1960	62,390	11	39	10	60	111	47	94	369	572	140	7.7	3.2	−.2

		1961	53,930	8.6	35	7.4	49	102	37	74	289	507	119	7.5	3.2	.2
		1962	41,500	15	43	10	68	122	45	105	381	625	148	7.7	1.6	.3
		1963	18,000	9.3	42	9.9	85	112	47	135	409	729	144	7.2	1.4	.3
		1964	12,920	10	34	7.2	79	91	41	121	357	640	115	7.9	2.1	.3
		1965	29,050	8.9	34	7.4	67	92	38	102	325	583	116	8.0	2.0	.2
		1966	19,450	8.1	36	7.4	65	93	48	97	324	576	121	8.0	1.6	.3
		1967	17,300	7.1	36	8.2	81	96	44	127	377	674	125	7.9	1.4	.3
		1968	44,400	4.8	27	5.5	35	81	25	55	217	373	90	7.5	.3	.1
		1969	61,900	5.3	36	6.8	60	93	34	90	293	523	111	7.7	1.2	.2
		1970	34,200	−1.0	38	8.5	68	105	46	102	336	599	130	7.6	2.3	−.1
		1971	26,900	−1.0	27	5.5	−1.0	77	26	54	−10	358	90	7.6	1.3	−.1
45	07331000	1945	3,520	−1.0	58	17	19	167	80	25	329	467	214	−.1	2.8	−.1
		1947	5,652	−1.0	60	21	25	171	98	33	348	535	236	−.1	2.7	−.1
		1951	1,916	−1.0	78	27	29	185	159	37	478	693	306	−.1	2.8	−.1
		1952	629	−1.0	75	29	43	189	169	46	499	736	306	−.1	5.2	−.1
		1953	518	−1.0	65	19	35	162	119	40	390	595	240	−.1	3.7	−.1
		1954	1,258	−1.0	63	16	26	153	101	36	350	545	223	−.1	2.5	−.1
		1955	878	−1.0	64	21	23	157	112	33	362	562	246	−.1	3.5	−.1
		1956	440	−1.0	87	35	46	185	211	62	573	880	361	−.1	4.1	−.1
		1957	3,555	−1.0	54	16	20	162	70	26	303	465	200	−.1	3.2	−.1
		1958	934	−1.0	84	31	43	229	149	62	522	787	337	−.1	1.9	−.1
		1959	640	−1.0	87	28	41	173	198	49	531	778	332	−.1	2.8	−.1
		1960	1,590	−1.0	94	32	40	199	212	46	575	814	368	8.1	2.4	−.1
		1961	1,140	12	88	31	42	197	186	56	564	810	348	8.1	2.4	.3
		1962	1,350	−1.0	94	29	43	199	213	49	581	840	363	8.2	−1.0	−.1
		1963	629	−1.0	95	37	56	162	269	68	661	938	390	8.2	−1.0	−.1
		1964	340	−1.0	−1.0	−1.0	42	144	207	54	552	777	324	8.4	−1.0	−.1
		1965	818	−1.0	−1.0	−1.0	39	152	181	53	507	739	304	8.2	−1.0	−.1
		1966	501	−1.0	−1.0	−1.0	48	169	299	57	705	971	432	8.3	3.6	−.1
		1967	429	−1.0	−1.0	−1.0	35	151	162	44	468	679	284	8.4	3.6	−.1
		1968	1,160	−1.0	−1.0	−1.0	27	153	90	37	341	525	215	8.3	1.6	−.1
		1969	1,530	−1.0	−1.0	−1.0	35	177	124	46	440	670	271	8.3	−1.0	−.1
		1970	662	−1.0	−1.0	−1.0	39	168	160	51	477	716	299	8.3	2.9	−.1
46	07331600	1945	7,261	−1.0	78	21	114	140	129	195	607	1,070	281	−.1	1.7	−.1
		1946	6,200	−1.0	67	19	84	152	100	139	538	874	245	−.1	.9	−.1
		1947	7,923	−1.0	90	24	149	148	164	250	805	1,340	323	−.1	2.0	−.1
		1948	3,528	−1.0	85	24	150	140	175	239	797	1,310	310	−.1	1.5	−.1
		1949	3,880	8.6	91	26	178	137	193	290	901	1,520	334	−.1	1.9	−.1
		1950	7,049	13	88	24	174	130	191	276	882	1,460	318	−.1	3.1	−.1
		1951	6,992	11	91	25	179	141	187	290	913	1,500	330	−.1	1.2	−.1
		1952	2,301	9.5	83	26	161	142	185	250	827	1,380	314	−.1	1.9	−.1

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
46	07331600	1953	1,853	9.5	92	29	190	142	207	305	944	1,570	348	−0.1	1.9	−0.1
		1954	3,950	12	89	24	184	128	200	299	908	1,530	320	−.1	1.7	−.1
		1955	2,762	9.9	96	22	190	126	209	306	937	1,570	330	−.1	1.5	−.1
		1956	3,550	11	106	23	219	122	248	346	1,030	1,720	359	−.1	1.1	−.1
		1957	10,890	11	89	18	167	112	195	258	840	1,370	296	−.1	2.2	−.1
		1958	4,320	11	91	20	171	136	185	268	837	1,400	309	−.1	1.0	−.1
		1959	2,298	9.4	104	28	252	135	246	390	1,100	1,880	374	−.1	.8	−.1
		1960	5,203	9.6	101	26	221	129	238	343	1,020	1,710	359	7.5	1.7	−.1
		1961	4,299	9.9	117	33	278	134	297	431	1,230	2,100	428	−.1	1.2	−.1
		1962	4,527	8.9	111	34	253	136	277	403	1,150	1,980	420	7.2	1.4	−.1
		1963	3,029	9.3	99	29	211	133	244	326	989	1,670	366	7.3	1.2	−.1
		1964	1,510	8.4	111	35	267	−1.0	290	420	1,200	2,040	422	7.3	1.2	−.1
		1965	1,943	5.6	101	30	238	135	251	373	1,070	1,850	376	7.2	1.1	−.1
		1966	2,813	2.4	110	30	252	138	264	403	1,130	1,980	397	7.2	.8	−.1
		1967	2,339	2.5	106	28	248	123	253	404	1,110	1920	380	7.2	1.0	−.1
		1968	4,124	4.1	91	23	198	132	188	316	890	1,560	321	7.7	4.0	−.1
		1969	5,320	6.3	87	22	180	145	173	286	829	1,450	308	7.5	2.2	.3
		1970	2,590	6.4	85	24	−1.0	137	182	303	861	1,500	309	7.4	−1.0	.3
		1971	1,790	5.4	80	23	−1.0	137	162	282	802	1,410	296	7.5	−1.0	.3
47	07344400	1957	−10	12	49	9.0	57	117	64	84	347	584	159	−.1	.7	.4
		1958	31,000	12	42	6.5	44	108	47	64	287	467	132	−.1	.7	.4
		1959	9,050	11	47	12	69	114	71	111	400	663	167	−.1	.6	.4
		1960	21,500	11	43	10	66	94	79	102	387	637	156	7.4	.6	.4
		1961	20,400	7.7	56	12	83	112	88	130	478	786	189	−.1	.5	.4
		1962	19,800	9.5	43	11	66	99	70	101	390	618	153	7.2	.5	.2
		1963	11,700	7.9	45	12	63	104	71	102	381	629	163	7.4	.5	.2
		1964	8,040	9.0	41	10	55	100	59	86	345	546	143	7.3	.5	.2
		1965	13,600	10	37	7.6	40	95	46	62	269	449	123	7.0	.4	.2
		1966	14,400	6.2	45	8.8	57	110	60	88	338	580	151	7.5	.4	.2
		1967	14,430	6.5	42	8.1	53	106	52	80	314	525	141	7.3	.3	.2
		1968	34,500	6.7	34	6.2	21	112	24	31	182	330	111	7.3	.2	.2
		1969	5,760	8.3	65	13	91	185	79	133	488	862	225	7.5	.5	.3
		1970	12,700	6.4	41	7.8	44	118	43	64	269	481	134	7.4	1.0	.2
		1971	6,830	5.8	37	8.7	40	117	36	60	248	457	128	7.3	.4	.2
		1972	7,920	6.0	46	9.5	61	125	54	94	337	608	154	7.4	.7	.2

48	07367000	1962	22,000	4.9	7.8	1.5	20	13	6.0	39	113	172	26	6.2	.4	.1
		1963	6,490	6.4	17	4.2	54	21	10	109	267	431	60	6.3	2.6	.1
		1964	9,800	6.2	9.7	2.6	25	21	7.4	46	130	210	35	6.5	1.9	.2
		1965	10,100	5.8	10	2.4	27	15	9.1	50	143	248	36	6.4	2.8	.2
		1966	11,600	6.4	8.8	1.9	22	16	8.5	38	119	187	29	6.0	3.5	.1
		1968	28,700	6.0	7.7	1.4	15	18	5.3	27	84	139	25	6.6	.8	.1
49	08030500	1948	8,193	−1.0	8	3.7	23	24	17	34	139	191	35	−.1	.2	−.1
		1949	8,636	11	6	3.1	18	21	12	27	113	147	28	−.1	.9	−.1
		1950	15,940	12	6	2.9	15	19	11	21	89	117	27	−.1	1.4	−.1
		1951	4,374	14	8.4	3.8	26	29	19	40	133	216	37	−.1	1.1	−.1
		1952	6,415	12	6.9	3.2	23	21	16	32	112	178	30	−.1	1.8	−.1
		1953	12,340	8.7	5.3	2.1	13	18	9.5	18	81	119	22	−.1	1.3	−.1
		1954	4,097	14	8.3	2.9	26	22	14	38	121	202	32	−.1	1.6	−.1
		1955	5,574	11	6.9	2.3	22	19	13	32	104	174	26	−.1	1.4	−.1
		1956	3,421	13	6.8	2.4	23	21	12	33	103	176	27	−.1	.9	−.1
		1957	9,645	11	8.0	2.5	17	27	10	24	88	151	30	−.1	1.2	−.1
		1958	12,290	9.7	7.2	2.1	18	21	13	24	85	146	26	−.1	.7	−.1
		1959	6,723	12	7.6	2.7	24	21	15	35	109	192	30	−.1	.7	−.1
		1960	6,545	11	9	3.3	25	23	19	36	117	202	36	6.2	1.3	−.1
		1961	12,410	16	6.3	2.4	18	21	12	24	90	144	26	−.1	.6	−.1
		1962	7,500	12	7.1	3.0	22	20	15	32	103	175	30	6.1	.9	−.1
		1963	2,831	13	8.6	3.5	31	21	19	47	134	235	36	6.2	.6	−.1
		1964	3,250	11	6.0	2.3	20	17	13	31	89	158	24	6.2	.5	−.1
		1965	4,081	11	11	2.7	25	32	17	35	120	212	39	6.5	.8	−.1
		1966	7,553	8.3	7.8	2.4	16	25	11	24	85	153	29	6.2	.6	−.1
		1967	1,959	12	6.7	1.9	17	20	9.0	26	85	144	24	6.4	.5	−.1
		1968	4,560	12	6.9	1.8	14	26	8.2	18	75	122	25	6.7	.5	−.1
		1969	12,300	5.2	9.4	2.6	16	32	11	22	83	154	34	6.9	.6	.0
		1970	2,760	−1.0	−1.0	−1.0	−1.0	−1.0	11	18	−10	138	−10	−.1	−1.0	−.1
		1971	3,320	−1.0	−1.0	−1.0	−1.0	−1.0	9.5	15	−10	122	−10	−.1	−1.0	−.1
50	08041000	1948	4,802	−1.0	7.8	4.1	20	17	22	30	140	179	36	−.1	.5	−.1
		1949	5,030	13	6.2	2.9	17	20	16	22	122	144	27	−.1	.7	−.1
		1950	11,370	16	6.6	3.6	11	20	12	18	83	115	31	−.1	.9	−.1
		1951	2,042	16	8.8	4.3	29	27	23	39	139	222	40	−.1	.9	−.1
		1952	3,718	15	7.6	3.7	22	23	22	27	115	174	34	−.1	1.3	−.1
		1953	8,177	10	5.8	2.4	11	19	11	13	66	109	24	−.1	1.5	−.1
		1954	2,114	17	8.1	3.4	24	25	17	32	127	194	34	−.1	1.5	−.1
		1955	3,149	13	7.8	2.8	21	22	17	27	107	169	31	−.1	1.0	−.1
		1956	1,608	14	8.6	2.9	26	28	17	33	117	198	34	−.1	1.1	−.1
		1957	4,607	12	6.2	2.5	15	21	12	17	78	127	26	−.1	1.4	−.1
		1958	8,465	11	7.0	2.3	16	20	16	19	83	134	27	−.1	.6	−.1

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
50	08041000	1959	5,162	12	7.5	2.8	17	22	17	21	89	151	30	−0.1	.8	−0.1
		1960	4,728	16	8.5	3.4	21	20	24	27	112	180	35	6.3	.6	−.1
		1961	10,410	11	5.8	2.4	15	17	16	18	77	126	24	−.1	.4	−.1
		1962	5,174	13	7.9	3.3	20	20	21	26	102	171	33	6.1	.7	−.1
		1963	2,153	12	9.2	3.6	26	25	24	33	122	205	38	6.3	.5	−.1
		1964	2,603	12	8.4	2.9	19	24	19	24	98	170	33	6.3	.8	−.1
		1965	1,659	11	10	3.3	24	31	19	33	119	209	39	6.3	.7	−.1
		1966	3,354	10	7.9	2.7	14	24	14	20	84	142	30	6.2	.9	−.1
		1967	1,612	10	10	3.3	19	38	13	28	107	186	39	6.6	.4	−.1
		1968	5,126	8.8	9.0	2.8	15	30	14	20	86	152	34	6.9	.6	−.1
		1969	9,380	8.1	8.3	3.2	14	28	16	18	82	142	34	6.9	.4	.1
		1970	2,360	9.0	9.5	3.5	18	26	21	24	98	179	37	6.9	−1.0	.0
		1971	1,130	9.5	9.7	3.3	22	32	.17	29	107	195	38	7.1	−1.0	.1
51	08065350	1964	1,200	10	51	5.9	100	147	75	115	437	781	153	7.2	8.8	−.1
		1965	6,580	9.8	45	3.8	31	131	37	33	228	396	127	7.3	3.7	−.1
		1966	6,640	8.4	43	3.3	27	130	31	31	215	384	121	7.2	2.8	.3
		1967	1,400	10	54	4.7	81	157	61	91	402	697	153	7.4	13	.8
		1968	9,360	7.2	46	3.6	26	133	34	27	215	376	129	7.5	3.5	−.1
		1969	7,720	7.4	44	3.7	28	127	36	29	217	381	126	7.4	5.3	−.1
		1970	5,090	7.7	48	4.8	34	134	45	33	248	435	139	7.5	−1.0	.2
		1971	1,350	10	48	6.4	57	139	64	55	333	576	146	7.6	−1.0	.5
52	08068000	1962	169	21	42	4.0	33	99	14	58	213	371	112	6.9	.9	.2
		1963	249	16	29	2.6	19	72	9.2	36	146	256	80	6.7	1.0	−.1
		1964	244	14	29	3.0	18	81	8.2	33	147	263	83	7.2	1.0	−.1
		1965	402	14	23	2.4	15	68	7.4	25	122	206	66	7.2	.9	−.1
		1966	430	13	25	2.3	14	70	8.0	27	128	223	72	6.8	.5	.2
		1967	766	16	29	2.5	20	81	8.2	38	158	272	82	7.1	.5	.3
		1968	684	12	23	2.0	10	65	5.0	20	105	188	66	7.5	1.0	−.1
		1969	683	12	23	2.1	13	62	10	24	114	200	66	7.3	1.8	−.1
		1970	119	15	29	3.4	21	77	10	41	159	280	87	7.3	−1.0	.0
		1971	49	17	29	2.3	24	80	7.6	42	163	292	83	7.4	−1.0	.0
53	08082500	1960	279	17	209	32	649	108	576	975	2,510	3,960	654	7.4	−1.0	−.1
		1961	807	15	211	32	548	96	592	817	2,270	3,550	658	−.1	−1.0	−.1
		1962	308	14	241	38	691	103	659	1,060	2,750	4,320	759	7.4	−1.0	−.1

		1963	299	15	233	42	734	123	646	1,110	2,850	4,390	753	7.3	−1.0	−.1
		1964	87	711	250	44	918	90	711	1,410	3,390	5,170	807	7.2	−1.0	−.1
		1965	197	12	237	33	537	129	626	805	2,320	3,680	728	7.2	−1.0	−.1
		1966	490	8.9	256	34	629	114	643	994	2,630	4,230	781	7.2	−1.0	−.1
		1967	350	10	233	38	691	154	575	1,080	2,710	4,280	735	7.5	−1.0	−.1
		1968	231	8.9	274	60	1,240	128	773	1,890	4,350	7,040	931	7.7	−1.0	−.1
		1969	278	9.7	207	33	614	131	579	887	2,420	3,880	652	7.5	−1.0	−.1
		1970	177	9.2	285	64	1,320	156	831	2,030	4,690	7,400	975	7.5	−1.0	−.1
		1971	311	11	202	27	−1.0	134	506	614	1,840	2,900	609	7.9	−1.0	−.1
54	08123800	1959	16	8.9	48	29	153	117	138	233	680	1,130	239	−.1	2.3	−.1
		1960	34	9.6	44	26	125	116	117	193	585	942	217	−.1	2.1	−.1
		1961	59	12	47	20	96	123	87	143	469	808	196	7.2	2.4	−.1
		1962	50	10	46	25	123	112	118	188	569	950	217	7.1	−1.0	−.1
		1963	12	11	70	49	255	140	238	401	1,100	1,800	378	7.3	3.5	−.1
		1964	10	12	67	39	218	156	212	314	947	1,560	327	7.9	6.2	−.1
		1965	50	9.0	50	16	85	143	81	123	439	770	192	7.5	3.0	−.1
		1966	44	7.2	65	37	176	132	176	292	829	1,420	315	7.9	2.1	−.1
		1967	20	9.1	77	44	199	175	270	402	1,170	1,880	432	7.7	−1.0	−.1
		1968	17	7.5	127	116	547	160	571	889	2,340	3,830	793	8.0	5.6	−.1
		1969	24	8.4	81	63	325	154	339	455	1,430	2,050	461	7.6	5.8	−.1
		1970	5.2	4.3	152	154	654	181	762	1,160	3,050	4,820	1,010	7.5	−1.0	−.1
55	08126500	1962	186	12	54	15	110	142	96	154	517	892	194	7.4	2.9	−.1
		1963	66	9.2	105	30	302	121	235	491	1,230	2,050	383	7.4	2.4	−.1
		1964	73	9.4	64	17	107	113	118	171	543	937	228	7.1	2.9	−.1
		1965	207	8.0	61	14	88	146	79	136	458	825	206	7.2	3.2	−.1
		1966	210	6.9	66	15	123	147	102	204	603	1,080	231	7.7	1.1	−.1
		1967	90	7.8	72	17	140	141	130	225	670	1,160	254	7.5	1.1	.4
		1968	16	6.1	126	53	230	151	378	403	1,320	2,110	599	7.9	4.7	−.1
		1969	52	8.6	91	33	105	159	195	180	700	1,150	363	7.8	6.9	−.1
		1970	30	8.3	128	56	170	198	329	285	1,100	1,730	550	7.5	−1.0	−.1
56	08158000	1948	1,319	−1.0	40	19	39	174	35	57	300	526	178	−.1	.8	−.1
		1949	1,214	9.5	42	14	36	170	30	50	274	487	162	−.1	1.5	−.1
		1950	1,263	11	41	14	34	162	30	48	270	464	160	−.1	1.4	−.1
		1951	1,056	11	39	17	37	161	35	55	282	497	167	−.1	1.0	−.1
		1952	754	11	40	14	44	160	35	61	293	522	158	−.1	1.5	−.1
		1953	921	11	43	11	19	164	17	27	225	384	152	−.1	3.1	−.1
		1954	945	12	45	12	22	182	17	28	235	408	162	−.1	1.9	−.1
		1955	1,322	8.6	42	12	31	167	22	41	243	431	154	−.1	1.0	−.1
		1956	1,331	8.2	42	9.9	30	158	22	40	234	416	146	−.1	1.1	−.1
		1957	4,900	9.1	38	7.1	23	137	17	30	201	349	124	−.1	2.6	−.1

Appendix F.—Annual data on streamflow chemical quality—Continued

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
56	08158000	1958	4,353	9.2	45	9.8	18	163	19	24	216	369	153	−0.1	3.8	−0.1
		1959	1,631	9.6	43	15	23	177	24	34	249	428	169	−.1	2.3	−.1
		1960	3,520	10	40	14	27	160	25	41	246	426	159	7.7	1.6	−.1
		1961	2,502	10	46	18	27	193	26	41	276	474	189	−.1	1.7	−.1
		1962	1,414	11	43	19	34	177	33	57	293	516	186	7.3	1.6	−.1
		1963	1,056	11	47	21	46	182	42	78	338	603	204	7.2	1.8	−.1
		1964	729	9.1	45	23	51	183	46	84	351	632	207	7.6	.9	−.1
		1965	1,475	9.8	47	17	32	180	32	53	283	513	187	7.2	2.3	−.1
		1966	1,642	6.6	49	16	23	189	26	40	258	477	186	7.5	1.3	−.1
		1967	1,027	7.1	45	17	27	181	27	44	260	470	180	7.7	.8	−.1
		1968	3,459	7.4	46	15	26	180	25	43	254	463	178	8.0	1.5	−.1
		1969	1,170	7.4	49	17	28	192	28	46	271	488	191	7.8	1.0	.2
		1970	2,830	7.9	48	17	−1.0	185	30	51	278	502	190	7.6	−1.0	.2
		1971	955	8.4	47	21	−1.0	188	38	63	310	558	203	7.7	−1.0	.3
57	08162000	1945	3,766	−1.0	47	13	18	168	27	32	255	413	171	−.1	1.9	−.1
		1946	3,535	−1.0	46	13	24	174	27	35	267	427	168	−.1	2.1	−.1
		1947	3,090	−1.0	50	15	25	186	31	38	280	454	186	−.1	2.1	−.1
		1948	1,246	−1.0	44	18	40	187	35	55	310	530	184	−.1	1.3	−.1
		1949	1,804	12	39	11	27	148	27	36	237	406	143	−.1	2.0	−.1
		1950	2,038	13	42	10	27	149	28	33	242	402	146	−.1	2.6	−.1
		1951	892	11	46	15	38	181	34	51	297	513	176	−.1	1.3	−.1
		1952	764	11	42	12	37	162	30	49	270	474	154	−.1	1.5	−.1
		1953	1,345	11	38	8.6	19	142	22	25	211	353	130	−.1	2.2	−.1
		1954	880	15	45	11	21	171	24	29	239	406	158	−.1	2.1	−.1
		1955	1,196	12	43	11	27	165	23	39	244	431	152	−.1	1.9	−.1
		1956	1,041	8.6	44	10	29	163	23	42	246	435	151	−.1	1.2	−.1
		1957	5,937	11	39	6.3	17	131	18	25	198	331	124	−.1	3.0	−.1
		1958	6,128	11	45	8.4	14	153	22	22	211	354	147	−.1	4.4	−.1
		1959	2,372	11	43	11	18	159	27	27	231	393	152	−.1	2.5	−.1
		1960	4,576	12	41	11	22	153	25	34	231	397	148	7.5	1.9	−.1
		1961	5,390	13	43	10	19	154	26	25	223	372	143	−.1	2.3	−.1
		1962	1,716	13	49	16	35	190	35	49	303	511	187	7.4	1.9	−.1
		1963	997	12	52	17	40	182	45	62	323	563	199	7.3	2.0	−.1
		1964	615	10	51	19	43	193	42	67	328	584	203	7.4	1.2	−.1
		1965	2,378	8.9	49	11	24	165	32	35	243	437	168	7.1	1.9	−.1
		1966	2,314	8.3	49	11	22	172	30	33	243	440	169	7.2	1.0	−.1

		1967	875	8.3	50	14	26	191	28	40	266	471	184	7.6	.3	−.1
		1968	5,146	8.2	46	11	22	163	26	33	229	409	161	7.9	1.6	−.1
		1969	2,100	9.6	49	10	23	165	31	32	238	421	164	7.7	2.1	−.1
		1970	3,640	8.7	47	16	26	175	31	43	261	481	183	7.7	−1.0	.2
		1971	1,060	9.6	49	16	30	182	34	48	278	514	187	7.7	−1.0	.2
58	08164500	1960	815	13	24	3	15•	86	6.3	20	129	213	72	6.8	1.1	−.1
		1961	1,508	12	19	2.5	14	39	4.9	17	107	180	58	−.1	1.1	−.1
		1962	280	17	35	5	28	123	11	39	203	341	107	7.0	1.5	−.1
		1963	122	19	35	6.7	36	131	14	50	228	393	116	6.8	1.5	−.1
		1964	175	20	27	6.3	33	111	13	42	198	338	92	6.9	1.3	−.1
		1965	448	13	26	3.5	18	94	9.9	22	141	240	79	6.7	1.0	−.1
		1966	634	13	25	3.5	17	91	9.5	22	138	241	77	7.0	.6	−.1
		1967	374	14	17	3.3	15	66	4.1	22	112	183	55	7.2	.5	−.1
		1968	1,043	9.4	18	2.4	12	63	6.8	15	95	172	55	7.5	1.0	−.1
		1969	721	12	29	2.8	16	98	7.9	21	138	237	83	7.3	1.4	.3
		1970	557	13	25	3.3	−1.0	87	8.1	22	136	230	75	7.0	−1.0	−.1
		1971	363	18	26	4.5	22	98	8.7	29	160	269	82	7.2	−1.0	−.1
59	08176500	1946	1,823	−1.0	69	18	83	191	39	160	532	881	246	−.1	2.6	−.1
		1949	1,200	14	57	15	48	190	28	86	380	632	204	−.1	2.7	−.1
		1950	1,061	15	60	17	56	199	32	104	425	711	220	−.1	2.2	−.1
		1951	542	16	53	17	52	195	30	89	371	648	202	−.1	2.1	−.1
		1952	819	17	45	12	36	166	24	56	291	497	162	−.1	2.8	−.1
		1953	1,074	17	51	14	37	179	29	61	319	538	184	−.1	3.5	−.1
		1954	548	19	46	14	37	179	27	58	304	516	172	−.1	3.2	−.1
		1955	374	18	46	12	38	184	27	51	293	507	164	−.1	2.5	−.1
		1956	132	16	56	16	55	235	30	72	368	639	206	−.1	1.1	−.1
		1957	1,973	13	45	7.3	18	153	21	26	227	370	142	−.1	4.0	−.1
		1958	3,541	14	53	11	20	183	27	31	264	441	177	−.1	6.1	−.1
		1959	1,580	15	60	14	25	219	28	35	303	511	207	−.1	5.0	−.1
		1960	1,764	16	58	13	25	215	27	33	288	481	198	−.1	3.9	−.1
		1961	3,865	15	53	11	22	188	24	29	258	428	177	−.1	3.3	−.1
		1962	914	17	55	16	35	210	34	47	321	537	202	7.4	3.3	−.1
		1963	565	15	61	15	31	230	31	42	316	538	216	7.5	3.4	−.1
		1964	568	13	51	14	29	201	26	37	281	479	184	7.5	2.6	−.1
		1965	1,812	11	51	10	20	183	24	26	236	418	169	7.3	2.5	−.1
		1966	1,551	11	57	12	23	202	27	33	266	472	189	7.4	2.4	−.1
		1967	1,225	9.5	44	7.6	15	158	15	20	191	337	139	7.7	1.0	−.1
		1968	2,942	11	54	9.8	22	185	25	30	246	432	174	7.8	2.8	−.1
		1969	1,820	12	57	11	29	193	31	40	284	481	187	7.8	3.2	.2
		1970	1,790	11	61	13	−1.0	221	26	32	281	486	208	7.7	−1.0	.2
		1971	860	12	52	13	−1.0	194	25	36	266	459	185	7.8	−1.0	.2

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
60	08188500	1959	597	18	77	16	57	242	73	70	457	732	258	−0.1	10	−0.1
		1960	429	18	73	15	65	232	74	78	460	745	244	−.1	9.8	−.1
		1961	995	16	60	11	43	188	55	52	347	564	194	−.1	6.1	−.1
		1962	374	20	77	17	75	246	84	90	514	816	265	7.7	9.7	−.1
		1963	196	18	81	17	79	239	91	102	524	863	271	7.5	11	−.1
		1964	289	16	71	15	62	217	73	78	431	732	236	7.5	8.4	−.1
		1965	676	14	64	11	43	198	54	53	343	582	204	7.3	6.7	−.1
		1966	390	15	75	14	62	222	74	81	446	769	246	7.6	8.6	−.1
		1967	1,165	11	44	4.1	17	139	20	20	191	317	126	7.6	1.6	−.1
		1968	1,141	14	75	12	52	204	69	70	406	672	234	7.9	6.6	−.1
		1969	538	16	77	14	66	218	81	86	460	764	250	7.8	8.9	−.1
		1970	507	16	78	14	−1.0	229	82	87	477	779	253	7.7	−1.0	.4
		1971	354	15	77	15	65	222	79	86	466	773	253	8.0	−1.0	−.1
61	08189500	1962	42	27	139	18	1,010	118	7.9	1,940	3,330	−10	418	7.6	−1.0	−.1
		1963	11	25	311	49	3,400	120	9.6	5,790	9,650	13,300	975	7.3	−1.0	−.1
		1964	14	16	246	41	2,730	107	7.9	4,700	7,800	11,300	783	7.2	−1.0	−.1
		1965	46	13	91	16	772	113	6.5	1,320	2,270	3,480	281	7.4	−1.0	−.1
		1966	126	11	57	7.6	379	91	5.2	638	1,170	2,050	174	7.4	−1.0	−.1
		1967	647	20	52	5.0	90	158	6.9	153	409	693	150	7.7	−1.0	−.1
		1968	167	16	68	9.4	287	120	11	569	955	1,920	207	7.7	−1.0	−.1
		1969	82	14	61	8.4	−1.0	113	−1.0	635	−10	2,100	186	7.5	−1.0	−.1
		1970	80	14	45	6.1	−1.0	103	−1.0	306	−10	1,100	137	7.3	−1.0	−.1
62	08211000	1948	148	−1.0	46	6.8	62	174	38	66	325	554	143	−.1	1.0	−.1
		1949	1,225	18	41	4.9	29	151	22	26	231	366	122	−.1	1.4	−.1
		1950	340	22	44	5.3	42	168	31	38	280	452	132	−.1	1.3	−.1
		1951	583	21	37	4.2	34	141	27	27	231	369	110	−.1	1.4	−.1
		1952	244	25	44	4.6	54	172	37	45	308	492	129	−.1	1.2	−.1
		1953	741	21	40	4.1	29	156	25	21	240	368	117	−.1	2.0	−.1
		1954	465	26	46	4.3	38	178	29	31	275	437	132	−.1	2.0	−.1
		1955	135	23	48	4.1	63	201	38	52	343	559	137	−.1	3.1	−.1
		1956	184	20	44	3.9	48	179	31	41	296	480	126	−.1	3.5	−.1
		1957	1,962	14	33	6.3	22	140	20	20	208	333	108	−.1	3.4	−.1
		1958	1,538	15	40	3.7	31	139	30	31	233	380	115	−.1	3.5	−.1
		1959	829	17	50	5.7	29	181	25	33	274	439	148	−.1	1.6	−.1
		1960	602	21	48	7.1	37	185	27	41	288	469	150	7.3	1.4	−.1

		1961	847	15	43	5.3	41	157	30	41	266	438	130	−.1	1.0	−.1
		1962	111	19	56	7.3	57	200	37	64	355	583	170	7.5	.8	−.1
		1963	109	16	49	7.6	80	198	41	87	382	657	153	7.5	.7	−.1
		1964	104	18	45	7.4	74	211	34	72	358	619	144	7.7	.8	−.1
		1965	787	15	49	4.8	30	188	19	24	238	405	142	7.2	.8	−.1
		1966	452	16	48	4.8	33	181	24	33	259	443	141	7.5	.8	−.1
		1967	2,167	12	32	1.6	12	108	14	9.7	141	224	86	7.1	.5	−.1
		1968	1,232	13	46	4.2	29	148	30	32	232	396	133	7.5	.5	−.1
		1969	135	18	65	6.2	49	201	44	61	344	583	186	7.9	.2	.2
		1970	719	17	59	6.0	−1.0	188	40	59	324	550	173	7.6	−1.0	.2
		1971	2,140	16	46	4.2	−1.0	160	18	21	208	350	131	7.5	−1.0	.2
63	08313000	1947	1,010	23	42	8.2	20	135	64	5.8	235	348	138	−.1	.9	−.1
		1948	1,876	23	35	6.2	17	116	46	5.5	194	293	113	−.1	1.2	−.1
		1949	1,800	22	38	6.7	16	121	51	6.2	206	313	122	−.1	1.2	−.1
		1950	916	23	41	8.4	20	134	61	6.4	231	354	137	−.1	1.1	−.1
		1951	546	25	44	8.7	22	151	61	6.6	242	379	146	−.1	.9	−.1
		1952	1,898	21	39	5.6	14	125	42	4.2	188	295	120	−.1	1.7	−.1
		1953	758	24	42	8.9	22	141	62	7.8	237	367	142	−.1	1.0	−.1
		1954	622	25	44	7.4	22	157	53	7.5	237	369	140	−.1	.7	−.1
		1955	597	26	47	9.2	23	161	61	8.4	255	392	156	−.1	1.0	−.1
		1956	519	26	43	8.3	23	151	53	7.7	236	366	142	−.1	.8	−.1
		1957	1,790	18	39	6.0	18	125	47	5.9	196	321	122	−.1	1.2	−.1
		1958	2,110	24	49	5.4	17	153	46	7.1	224	347	144	−.1	1.1	−.1
		1959	704	28	44	7.8	22	151	58	7.1	242	365	142	−.1	.9	−.1
		1960	1,131	25	40	5.9	19	125	52	5.7	211	323	124	7.9	1.0	−.1
		1961	933	25	46	5.6	20	145	70	6.1	229	351	137	7.7	.8	−.1
		1962	1,436	24	40	6.3	18	126	53	5.0	210	324	126	8.0	.8	−.1
		1963	774	22	41	6.8	20	131	57	6.1	218	338	129	7.8	.7	−.1
		1964	528	24	45	7.0	24	152	60	6.6	242	372	142	8.0	.9	−.1
		1965	1,627	21	41	4.9	17	121	54	5.0	205	319	122	7.8	1.1	−.1
		1966	1,300	22	43	6.7	22	127	67	6.2	232	361	136	7.9	1.2	−.1
		1967	802	24	51	7.9	19	147	87	7.9	281	434	161	7.8	1.1	−.1
		1968	1,180	22	43	6.1	21	128	59	6.1	220	351	132	7.6	1.1	−.1
		1969	1,460	20	43	6.1	22	127	67	4.9	227	356	132	7.8	.9	−.1
		1970	1,260	22	41	6.4	22	124	63	6.7	225	348	130	7.9	1.1	−.1
		1971	836	23	39	7.2	24	129	63	6.6	227	353	130	7.9	−1.0	−.1
		1972	733	24	43	7.9	23	135	74	7.9	251	381	140	8.0	−1.0	.4
64	08358300	1954	204	−1.0	111	22	147	−1.0	−1.0	−1.0	911	1,280	368	−.1	−1.0	−.1
		1955	256	−1.0	113	22	126	225	−1.0	−1.0	834	1,190	372	−.1	−1.0	−.1
		1956	253	−1.0	85	19	106	221	−1.0	−1.0	665	985	290	−.1	−1.0	−.1
		1957	462	−1.0	71	12	73	194	−1.0	−1.0	505	763	226	−.1	−1.0	−.1

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
64	08358300	1958	63	−1.0	85	15	120	223	−1.0	−1.0	693	1,060	274	−0.1	−1.0	−0.1
		1959	225	−1.0	93	18	122	233	−1.0	−1.0	751	1,090	306	−.1	−1.0	−.1
		1960	410	−1.0	74	11	74	200	−1.0	−1.0	515	753	229	8.0	−1.0	−.1
		1961	423	−1.0	77	11	76	203	−1.0	−1.0	502	749	229	7.9	−1.0	−.1
		1962	738	−1.0	66	9.3	54	190	−1.0	−1.0	414	622	202	7.8	−1.0	−.1
		1963	584	−1.0	64	10	57	185	−1.0	−1.0	425	634	202	7.7	−1.0	−.1
		1964	236	−1.0	84	12	84	221	−1.0	−1.0	576	840	260	7.7	−1.0	−.1
		1965	728	−1.0	66	9.7	50	182	−1.0	−1.0	404	621	206	7.8	−1.0	−.1
		1966	996	−1.0	62	10	49	175	−1.0	−1.0	399	602	197	7.8	−1.0	−.1
		1967	463	−1.0	90	15	85	207	−1.0	−1.0	604	898	286	7.7	−1.0	−.1
		1968	664	−1.0	66	10	58	188	−1.0	−1.0	437	657	207	7.6	−1.0	−.1
		1969	947	25	65	11	60	182	133	33	421	643	207	7.7	2.4	.5
		1970	1,230	27	70	6.8	−1.0	184	126	33	417	637	202	7.7	2.7	−.1
		1971	559	29	61	10	59	189	119	35	421	640	194	7.7	−1.0	.6
		1972	497	24	68	13	78	197	182	41	514	760	222	7.5	−1.0	.6
65	08407500	1938	182	17	457	160	907	138	1,510	1,450	4,650	6,680	1,800	−.1	2.1	−.1
		1939	148	17	509	186	940	134	1,780	1,510	5,030	7,140	2,030	−.1	2.7	−.1
		1940	135	18	496	190	982	131	1,770	1,580	5,120	7,340	2,020	−.1	2.8	−.1
		1941	1,655	17	297	68	267	103	911	397	2,010	2,700	1,020	−.1	1.9	−.1
		1942	1,100	18	424	109	443	140	1,360	681	3,110	4,230	1,510	−.1	1.8	−.1
		1943	327	18	463	143	631	131	1,580	980	3,900	5,160	1,740	−.1	2.1	−.1
		1944	168	19	481	174	828	140	1,710	1,290	4,600	6,450	1,920	−.1	5.5	−.1
		1945	143	19	487	173	908	153	1,670	1,440	4,780	6,740	1,930	7.6	3.2	−.1
		1946	104	20	459	185	1,110	163	1,650	1,750	5,260	7,560	1,910	7.5	4.6	−.1
		1947	137	19	490	167	913	161	1,650	1,440	4,760	6,680	1,910	7.7	4.2	−.1
		1949	156	15	417	160	823	153	1,410	1,330	4,230	6,090	1,700	7.6	4.4	−.1
		1950	218	15	475	157	695	161	1,520	1,130	4,080	5,720	1,830	7.6	5.0	−.1
		1952	56	16	530	223	1,600	173	1,900	2,550	6,900	10,000	2,240	7.4	8.0	−.1
		1954	56	9.3	371	143	1,590	136	1,290	2,490	5,960	9,050	1,510	7.3	3.0	−.1
		1955	292	13	255	73	566	143	770	884	2,630	3,860	936	7.5	7.0	−.1
		1956	88	16	483	191	1,570	138	1,700	2,490	6,520	9,590	1,990	7.5	3.0	−.1
		1957	47	15	440	201	2,070	131	1,940	3,260	8,050	11,400	1,920	−.1	4.0	−.1
		1958	140	9.0	387	113	963	136	1,700	1,540	4,490	6,310	1,430	−.1	4.0	−.1
		1959	111	18	465	149	1,280	122	1,750	2,020	5,760	8,050	1,750	−.1	3.0	−.1
		1960	115	20	435	130	1,230	139	1,750	1,950	5,460	7,640	1,620	7.6	7.7	−.1
		1961	104	14	526	179	1,470	150	1,800	2,340	6,720	9,430	2,050	7.6	3.1	−.1

		1962	51	13	549	223	2,240	[illegible]	2,200	3,580	9,150	13,000	2,290	7.4	3.5	−.1
		1963	50	12	519	216	2,280	127	1,500	3,630	9,040	13,100	2,180	7.3	1.7	−.1
		1964	27	11	511	224	2,160	145	1,940	3,400	8,330	12,900	2,220	7.4	3.0	−.1
		1965	54	11	405	141	2,290	122	1,390	3,600	7,940	11,700	1,590	7.5	3.0	−.1
		1966	398	10	164	34	276	118	436	429	1,420	2,200	550	7.5	5.3	−.1
		1967	39	12	512	259	3,370	148	2,000	5,350	11,610	17,680	2,340	7.5	4.2	−.1
		1968	35	13	481	233	2,940	145	1,850	4,650	10,300	15,600	2,160	7.5	2.6	−.1
		1969	32	13	506	237	2,910	138	1,960	4,690	10,400	15,500	2,240	7.6	3.3	−.1
		1970	123	11	326	119	1,160	137	1,070	1,850	4,570	−10	1,300	7.7	2.8	−.1
		1971	32	11	523	229	2,430	150	1,910	3,870	9,100	13,500	2,270	7.6	−1.0	1.1
		1972	25	11	577	284	4,000	151	2,360	6,430	13,900	21,300	2,620	7.6	−1.0	1.1
66	09152500	1934	660	16	143	61	146	183	707	25	1,300	−10	608	−.1	12	.4
		1935	1,916	17	90	32	67	154	341	11	644	−10	356	−.1	6.0	.2
		1936	2,415	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	627	−10	−10	−.1	6.0	.2
		1937	2,066	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	716	−10	−10	−.1	−1.0	−.1
		1938	3,389	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	600	772	−10	−.1	−1.0	−.1
		1939	1,938	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	787	1,030	−10	−.1	−1.0	−.1
		1940	1,450	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	1,010	1,250	−10	−.1	−1.0	−.1
		1941	3,170	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	618	872	−10	−.1	−1.0	−.1
		1942	4,000	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	566	733	−10	−.1	−1.0	−.1
		1943	2,432	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	675	891	−10	−.1	−1.0	−.1
		1944	3,540	−1.0	69	22	45	141	224	6.7	443	649	262	−.1	3.6	−.1
		1945	2,630	16	83	31	63	159	309	12	595	833	334	−.1	3.8	−.1
		1946	2,080	17	99	35	76	180	371	13	703	972	390	7.7	2.9	−.1
		1947	2,554	16	88	31	68	162	332	9.5	626	846	347	7.8	2.1	−.1
		1948	3,368	17	85	30	61	155	299	12	593	795	336	7.5	6.1	−.1
		1949	2,927	18	83	27	56	162	280	7.1	555	784	315	8.0	4.7	−.1
		1950	1,916	15	75	26	50	149	256	7.9	506	727	294	7.6	3.1	−.1
		1951	1,378	17	114	43	86	178	466	13	832	1,120	462	−.1	5.4	−.1
		1952	3,502	16	75	24	44	158	234	7.3	485	675	286	−.1	2.8	−.1
		1953	1,806	16	105	40	76	170	412	11	754	1,020	426	−.1	5.2	−.1
		1954	913	−1.0	162	54	126	−1.0	−1.0	−1.0	1,240	1,530	626	−.1	−1.0	−.1
		1955	1,426	−1.0	116	34	79	−1.0	−1.0	−1.0	830	1,060	430	−.1	−1.0	−.1
		1956	1,533	−1.0	100	32	68	159	−1.0	−1.0	717	936	381	7.7	−1.0	−.1
		1957	4,432	15	69	18	37	147	188	8.3	433	602	246	7.3	3.3	−.1
		1958	3,292	16	76	25	47	151	248	8.2	530	713	292	7.6	3.9	−.1
		1959	1,313	16	123	45	91	187	506	14	954	1,200	492	8.0	5.3	−.1
		1960	1,915	14	93	30	60	165	332	8.4	623	868	356	7.6	2.2	−.1
		1961	1,403	14	121	38	77	183	449	12	839	1,090	457	7.7	2.9	−.1
		1962	3,031	−1.0	−1.0	−1.0	42	146	231	5.6	468	662	278	7.6	−1.0	−.1
		1963	1,262	−1.0	−1.0	−1.0	96	196	510	13	944	1,200	502	7.5	−1.0	−.1
		1964	1,856	−1.0	−1.0	−1.0	59	169	353	10	714	915	393	7.7	−1.0	−.1

Appendix F.—*Annual data on streamflow chemical quality*—Continued

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
66	09152500	1965	3,606	−1.0	−1.0	−1.0	40	139	228	5.9	476	651	273	7.7	−1.0	−0.1
		1966	1,444	−1.0	−1.0	−1.0	84	178	487	12	901	1,150	488	7.8	−1.0	−.1
		1967	1,225	−1.0	−1.0	−1.0	108	198	567	15	1,030	1,270	539	7.8	−1.0	−.1
		1968	1,990	12	99	37	63	173	375	10	720	939	399	7.8	3.5	−.1
		1969	2,590	12	88	34	57	165	315	10	638	846	355	7.8	3.6	−.1
		1970	3,350	13	68	24	40	143	223	7.2	446	658	269	7.8	3.1	.4
		1971	3,270	13	71	24	43	144	233	9.5	743	701	278	7.8	−1.0	.3
		1972	1,470	14	109	38	70	180	412	14	755	1,050	431	8.0	−1.0	.5
67	09180500	1929	11,800	16	66	25	62	142	216	39	503	−10	268	−.1	4.6	−.1
		1930	8,420	14	73	28	80	156	254	55	593	−10	297	−.1	6.1	−.1
		1931	3,960	13	102	43	147	182	426	107	950	−10	432	−.1	18	−.1
		1932	9,210	13	69	25	72	152	228	48	540	−10	275	−.1	6.0	−.1
		1933	6,400	12	75	29	86	144	273	59	616	−10	306	−.1	6.6	−.1
		1934	3,066	14	105	48	154	172	474	109	1,010	−10	460	−.1	11	−.1
		1935	6,466	14	75	28	81	148	256	60	596	−10	302	−.1	5.5	.2
		1936	8,120	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	541	799	−10	−.1	−1.0	−.1
		1937	6,383	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	693	−10	−10	−.1	−1.0	−.1
		1938	10,250	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	546	−10	−10	−.1	−1.0	−.1
		1939	5,873	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	734	1,030	−10	−.1	−1.0	−.1
		1940	4,771	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	836	−10	−10	−.1	−1.0	−.1
		1941	9,084	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	610	−10	−10	−.1	−1.0	−.1
		1942	10,640	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	551	−10	−10	−.1	−1.0	−.1
		1947	8,358	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	821	−10	−.1	−1.0	−.1
		1948	9,028	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	823	−10	−.1	−1.0	−.1
		1949	8,685	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	815	−10	−.1	−1.0	−.1
		1950	6,006	13	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	1,030	−10	7.9	−1.0	−.1
		1951	5,152	15	85	32	99	159	291	90	726	1,040	344	−.1	4.3	−.1
		1952	11,380	13	63	20	54	148	162	45	452	680	239	−.1	2.6	−.1
		1953	4,710	14	93	36	118	167	326	114	818	1,200	379	−.1	5.3	−.1
		1954	3,297	13	120	47	148	181	457	130	1,020	1,490	493	−.1	8.0	−.1
		1955	5,137	13	93	32	95	159	301	88	709	1,060	364	−.1	6.0	−.1
		1956	6,243	13	83	27	81	149	256	74	617	921	318	−.1	7.2	−.1
		1957	11,720	12	68	17	53	145	163	47	440	679	240	−.1	4.6	−.1
		1958	8,777	12	71	23	77	140	216	74	553	859	272	−.1	6.4	−.1
		1959	4,296	13	100	35	122	168	350	115	828	1,250	394	−.1	6.3	−.1
		1960	5,692	12	82	27	86	150	258	77	628	952	316	−.1	7.2	−.1

		1961	4,260	10	107	34	111	159	363	101	818	1,220	409	7.8	8.7	–.1
		1962	9,249	–1.0	74	18	64	150	182	57	488	742	258	7.7	4.2	–.1
		1963	3,895	–1.0	–1.0	–1.0	136	179	391	125	931	1,370	441	7.5	7.4	–.1
		1964	4,624	–1.0	–1.0	–1.0	110	174	306	104	774	1,110	372	7.7	4.3	–.1
		1965	8,845	–1.0	72	23	65	151	191	65	530	791	276	7.7	3.5	–.1
		1966	4,844	8.8	87	37	114	163	309	113	791	1,160	370	7.8	5.3	–.1
		1967	4,175	9.4	108	36	137	182	371	122	900	1,280	415	7.7	6.4	–.1
		1968	5,870	9.6	79	32	88	164	258	81	653	953	326	7.8	–1.0	–.1
		1969	6,574	11	79	29	79	166	240	73	631	924	319	7.6	4.2	–.1
		1972	5,090	–1.0	90	30	102	164	285	101	–10	1,090	347	7.7	–1.0	–.1
68	09234500	1957	2,677	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	–1.0	359	544	203	–.1	–1.0	–.1
		1958	2,430	9.4	53	17	40	173	127	12	356	553	202	–.1	1.4	.2
		1959	1,567	9.2	55	19	47	170	155	14	396	600	215	–.1	1.2	.3
		1960	1,542	11	58	21	53	182	168	17	426	650	231	–.1	1.0	.3
		1961	1,032	9.4	58	20	50	176	171	16	425	636	228	7.9	1.3	.3
		1962	2,919	–1.0	–1.0	–1.0	46	163	134	18	378	590	215	7.7	–1.0	–.1
		1963	231	–1.0	–1.0	–1.0	83	216	294	27	650	946	336	7.8	–1.0	–.1
		1964	1,154	–1.0	–1.0	–1.0	56	188	181	20	449	678	248	7.7	–1.0	–.1
		1965	2,227	–1.0	74	27	64	195	234	22	557	764	296	7.8	–1.0	–.1
		1966	1,632	6.5	70	27	63	181	233	23	537	787	286	7.9	–1.0	–.1
		1967	2,162	5.6	77	29	66	188	265	22	593	844	312	7.8	7.4	.5
		1968	2,530	5.1	72	31	66	190	259	21	572	818	309	7.2	7.5	.5
		1969	2,690	3.5	64	33	63	181	229	23	536	780	282	7.6	–1.0	–.1
		1970	2,520	4.1	60	24	56	178	191	19	476	706	249	7.8	3.5	–.1
		1972	3,020	–1.0	69	25	57	200	212	18	–10	773	272	7.9	–1.0	–.1
69	09251000	1951	1,622	11	21	7.2	11	86	27	5.0	133	200	82	–.1	1.1	.6
		1952	2,013	11	23	8.2	11	97	31	4.8	146	219	91	–.1	1.1	.4
		1953	1,145	10	23	8.4	14	97	31	7.2	154	237	92	–.1	1.5	.4
		1954	721	9.7	25	9.4	18	104	40	9.8	172	273	101	–.1	1.2	–.1
		1955	1,067	10	23	7.5	13	93	31	8.1	153	237	88	–.1	1.8	–.1
		1956	1,430	12	24	7.0	12	92	29	6.3	149	226	89	–.1	2.1	–.1
		1957	2,460	11	27	6.2	12	97	31	4.5	155	234	93	–.1	1.2	–.1
		1958	1,752	10	27	8.0	14	102	40	5.8	172	265	100	–.1	2.7	–.1
		1959	1,124	9.6	23	7.8	15	94	35	6.0	154	239	90	–.1	1.6	–.1
		1960	1,392	10	25	7.1	14	97	32	5.5	152	237	92	–.1	1.8	–.1
		1961	869	9.8	26	8.0	17	103	37	8.6	166	261	98	7.3	1.6	–.1
		1962	2,060	–1.0	–1.0	–1.0	18	108	47	6.2	180	285	106	7.3	–1.0	–.1
		1963	870	–1.0	–1.0	–1.0	21	103	40	13	173	278	98	7.1	–1.0	–.1
		1964	1,192	–1.0	–1.0	–1.0	14	99	29	6.7	148	232	91	7.4	–1.0	–.1
		1965	1,814	–1.0	–1.0	–1.0	12	83	30	5.0	126	202	81	7.3	–1.0	–.1
		1966	971	–1.0	–1.0	–1.0	32	144	61	14	235	383	133	7.7	–1.0	–.1

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
69	09251000	1967	1,253	−1.0	−1.0	−1.0	17	96	39	6.6	171	242	93	7.5	−1.0	−0.1
		1968	1,580	9.0	27	13	20	123	47	9.1	201	304	122	7.7	.6	−.1
		1969	1,520	8.6	24	9.5	14	102	35	7.0	166	243	99	7.4	1.9	−.1
		1970	2,010	9.8	27	9.8	16	105	47	6.2	176	269	108	7.6	1.4	.2
		1971	2,080	10	26	11	18	103	55	6.3	180	280	108	7.6	−1.0	.2
		1972	1,170	9.6	27	11	21	111	56	7.5	190	296	111	7.9	−1.0	.2
70	09306500	1951	702	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	403	627	−10	−.1	−1.0	−.1
		1952	996	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	442	699	−10	−.1	−1.0	−.1
		1953	619	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	505	799	−10	−.1	−1.0	−.1
		1954	470	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	584	956	−10	−.1	−1.0	−.1
		1955	536	16	68	23	67	205	159	53	502	784	264	−.1	4.5	−.1
		1956	577	17	66	21	61	204	139	49	471	732	251	−.1	6.4	−.1
		1957	1,003	15	66	19	53	212	125	36	438	691	242	−.1	8.9	−.1
		1958	811	15	64	21	60	193	141	43	473	739	246	−.1	25	−.1
		1959	574	17	64	20	61	200	138	49	458	719	242	−.1	1.2	−.1
		1960	552	14	62	18	61	192	132	50	443	693	228	8.1	1.7	−.1
		1961	476	16	68	19	69	201	146	60	490	765	250	7.9	1.2	−.1
		1962	922	−1.0	−1.0	−1.0	62	206	149	38	447	703	243	7.9	−1.0	−.1
		1963	466	−1.0	−1.0	−1.0	81	214	165	66	529	828	266	7.7	−1.0	−.1
		1964	546	−1.0	−1.0	−1.0	70	204	129	62	457	721	238	7.7	.8	−.1
		1965	782	−1.0	−1.0	−1.0	63	202	143	48	457	707	245	7.9	−1.0	−.1
		1966	504	−1.0	−1.0	−1.0	83	212	177	64	537	839	268	7.9	−1.0	−.1
		1967	533	−1.0	−1.0	−1.0	72	209	148	56	490	760	249	7.9	−1.0	−.1
		1968	655	−1.0	−1.0	−1.0	64	203	138	51	475	713	241	7.9	−1.0	−.1
		1969	665	−1.0	−1.0	−1.0	50	203	128	30	408	623	233	7.9	−1.0	−.1
		1970	913	12	61	23	51	225	131	31	430	669	248	8.1	−1.0	.3
		1972	890	13	49	15	29	160	88	20	−10	469	184	7.9	−1.0	.2
71	09315000	1929	8,930	16	55	21	49	169	154	22	406	−10	224	−.1	1.4	−.1
		1930	6,290	14	59	23	56	179	177	26	448	−10	242	−.1	1.2	−.1
		1931	3,300	11	62	25	70	185	199	35	499	−10	258	−.1	2.6	−.1
		1932	6,640	11	55	19	47	177	134	21	378	−10	216	−.1	1.9	−.1
		1933	4,870	12	55	21	54	172	156	25	412	−10	224	−.1	1.5	−.1
		1934	1,805	12	63	29	86	193	234	44	568	−10	276	−.1	1.1	−.1
		1935	3,936	13	54	19	45	169	129	24	371	−10	213	−.1	1.0	.3
		1936	5,713	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	416	602	−10	−.1	−1.0	−.1

		1937	5,709	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	517	−10	−10	−.1	−1.0	−.1
		1938	6,557	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	467	−10	−10	−.1	−1.0	−.1
		1939	4,724	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	505	755	−10	−.1	−1.0	−.1
		1940	3,273	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	505	−10	−10	−.1	−1.0	−.1
		1941	5,860	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	505	−10	−10	−.1	−1.0	−.1
		1942	6,893	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	480	−10	−10	−.1	−1.0	−.1
		1943	5,900	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	442	−10	−10	−.1	−1.0	−.1
		1947	7,574	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	616	−10	−.1	−1.0	−.1
		1948	5,713	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	660	−10	−.1	−1.0	−.1
		1949	6,764	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	653	−10	−.1	−1.0	−.1
		1950	7,612	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	676	−10	−.1	−1.0	−.1
		1951	5,948	12	61	23	51	201	157	21	449	662	246	−.1	1.2	−.1
		1952	9,427	14	64	23	55	214	163	21	459	693	254	−.1	1.9	−.1
		1953	4,689	12	64	27	62	202	188	26	496	740	270	−.1	2.1	−.1
		1954	3,689	−1.0	65	22	65	−1.0	−1.0	−1.0	498	749	252	−.1	−1.0	−.1
		1955	3,949	−1.0	64	19	63	−1.0	−1.0	−1.0	466	706	238	−.1	−1.0	−.1
		1956	5,588	13	54	18	46	177	131	20	380	583	208	7.8	3.2	−.1
		1957	7,654	13	51	17	44	168	129	18	370	562	197	7.3	2.0	−.1
		1958	6,169	12	57	22	54	186	159	21	431	655	282	7.9	2.5	−.1
		1959	3,806	12	58	22	63	184	183	26	466	701	235	7.8	1.5	−.1
		1960	4,158	13	56	19	56	177	156	24	428	643	218	7.9	1.6	−.1
		1961	2,799	12	61	21	63	182	184	30	475	714	240	7.9	1.5	−.1
		1962	8,051	−1.0	−1.0	−1.0	49	178	143	19	395	610	216	7.9	−1.0	−.1
		1963	2,297	−1.0	−1.0	−1.0	90	191	258	38	600	880	281	7.7	−1.0	−.1
		1964	3,853	−1.0	−1.0	−1.0	62	201	167	29	464	690	243	7.8	−1.0	−.1
		1965	7,091	−1.0	62	24	60	190	184	24	472	705	252	7.8	−1.0	−.1
		1966	4,436	8.5	62	28	73	187	226	28	547	806	271	7.8	−1.0	−.1
		1967	5,524	9.2	69	27	71	196	232	25	546	791	283	7.8	−1.0	−.1
		1968	6,430	9.4	66	28	69	189	216	25	538	762	278	7.8	−1.0	−.1
		1969	6,796	7.8	63	28	63	193	209	23	520	746	271	7.8	−1.0	−.1
72	09368000	1942	3,855	14	53	11	25	136	105	6.8	281	440	178	−.1	1.2	.3
		1943	1,823	12	53	12	38	118	142	11	329	490	182	−.1	2.4	.3
		1944	2,907	12	39	8.0	24	101	90	6.6	233	358	130	−.1	1.3	.3
		1945	2,020	14	47	10	34	115	120	9.0	293	439	158	7.9	1.5	.3
		1958	3,301	12	49	6.8	27	125	92	9.9	259	401	150	−.1	1.6	−.1
		1959	861	13	76	12	62	147	213	22	474	710	239	−.1	4.0	−.1
		1960	2,338	14	51	7.7	35	118	118	10	296	458	158	7.5	9.0	−.1
		1961	1,634	13	61	10	48	135	160	15	379	573	196	7.4	4.4	−.1
		1962	1,991	13	49	8.7	34	110	116	13	290	449	157	7.2	3.5	−.1
		1963	702	10	90	14	81	166	281	26	589	869	285	7.6	3.9	−.1
		1964	957	12	79	12	67	158	232	17	499	750	245	7.6	3.6	−.1
		1965	2,670	10	55	8.0	35	120	127	8.1	307	475	170	7.6	2.4	−.1

Appendix F.—*Annual data on stream[illegible] chemical quality*—Continued

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
72	09368000	1966	2,418	11	50	10	35	119	125	8.5	302	473	167	7.7	2.7	0.3
		1967	1,119	11	75	13	76	149	246	16	515	769	240	7.6	4.1	.3
		1968	1,220	10	69	11	48	139	176	12	400	621	216	7.5	3.5	.4
		1969	2,080	11	55	9.3	37	129	136	6.9	323	502	179	7.8	2.1	.3
		1970	1,720	10	57	9.0	36	121	139	9.1	323	511	180	7.9	1.7	.4
		1972	1,310	9.7	60	12	43	130	168	12	374	568	199	7.9	−1.0	.4
73	09379500	1930	2,380	16	75	17	50	159	214	11	466	−10	257	−.1	1.7	−.1
		1931	1,230	13	85	20	68	163	274	15	563	−10	294	−.1	4.8	−.1
		1932	4,060	13	64	13	41	144	167	8.6	383	−10	213	−.1	2.1	−.1
		1933	1,710	13	77	18	58	147	240	13	498	−10	266	−.1	2.3	−.1
		1934	914	15	96	22	81	167	332	18	655	−10	330	−.1	2.9	.3
		1935	3,016	15	60	11	38	140	145	8.4	353	−10	194	−.1	1.9	.4
		1936	2,246	16	74	16	46	161	196	10	445	−10	250	−.1	1.9	.3
		1937	3,227	18	69	15	44	160	181	9.3	422	612	234	−.1	1.9	−.1
		1938	3,407	15	65	14	43	149	170	8.5	393	578	220	−.1	1.4	−.1
		1939	1,712	16	73	16	46	161	195	12	446	653	248	−.1	2.2	.3
		1940	1,372	16	82	18	64	160	258	15	539	753	278	−.1	1.6	.5
		1941	5,859	15	68	14	41	160	154	8.8	387	603	227	−.1	1.7	.4
		1942	4,254	14	66	16	39	157	168	9.4	476	597	230	−.1	1.6	.3
		1943	1,996	13	78	20	51	167	214	15	476	698	276	−.1	2.6	.3
		1944	3,205	13	62	13	30	151	134	9.6	343	524	208	−.1	2.6	.3
		1945	2,237	12	71	17	49	167	187	13	434	648	247	7.8	2.5	.3
		1946	1,194	13	89	22	66	188	271	18	576	811	312	7.6	3.3	.2
		1947	2,056	14	76	17	57	157	225	12	481	698	260	7.7	2.1	.2
		1948	3,194	13	59	12	36	143	137	9.2	339	503	196	7.7	1.6	.3
		1949	3,485	12	61	14	36	143	148	8.7	352	526	210	7.7	1.8	.3
		1950	1,246	14	78	22	53	154	240	16	501	730	285	7.6	2.0	.3
		1951	888	15	85	22	65	161	271	20	578	808	302	−.1	2.4	.4
		1952	4,262	12	55	12	30	134	121	8.1	312	460	186	−.1	2.3	.3
		1953	1,306	14	77	19	58	150	243	16	522	739	270	−.1	2.0	.4
		1954	1,378	14	88	21	69	169	280	18	589	830	306	−.1	2.2	−.1
		1955	1,395	15	78	17	61	161	237	16	522	747	264	−.1	2.4	−.1
		1956	1,187	14	72	17	52	145	214	15	475	674	250	−.1	3.7	−.1
		1957	3,587	13	60	9.8	37	134	143	11	357	525	190	−.1	2.4	−.1
		1958	3,523	11	59	13	36	134	153	11	368	541	200	−.1	3.0	−.1
		1959	854	9.9	88	22	76	153	307	25	663	891	310	−.1	5.1	−.1

		1960	*2,329*	*12*	*58*	*13*	*44*	[illegible]	*163*	*13*	*380*	*558*	*198*	*−.1*	*3.3*	*−.1*
		1961	*1,641*	*11*	*75*	*16*	59	146	227	19	498	719	252	7.8	5.2	−.1
		1962	2,087	−1.0	−1.0	−1.0	45	133	177	15	403	592	214	7.7	−1.0	−.1
		1963	864	−1.0	−1.0	−1.0	108	190	430	33	852	1,180	416	7.5	−1.0	−.1
		1964	1,091	−1.0	−1.0	−1.0	90	189	325	24	703	959	339	7.7	−1.0	−.1
		1965	2,801	−1.0	67	17	47	152	192	13	399	629	240	7.6	−1.0	−.1
		1966	2,721	11	64	19	48	141	199	13	432	630	237	7.6	−1.0	−.1
		1967	1,279	11	93	26	95	191	347	21	714	974	339	7.7	−1.0	−.1
		1968	1,400	11	84	26	70	170	289	19	612	838	316	7.7	−1.0	−.1
		1969	2,283	9.7	69	20	51	154	208	16	475	670	360	7.7	−1.0	−.1
		1970	2,801	−1.0	67	17	47	152	192	13	399	629	240	7.6	−1.0	−.1
		1972	1,170	8.7	79	22	70	150	266	20	593	787	285	8.0	−1.0	.4
74	09380000	1929	26,500	17	72	23	62	160	222	35	518	−10	274	−.1	2.2	−.1
		1930	18,000	15	76	25	74	167	247	44	571	−10	292	−.1	2.5	−.1
		1943	16,470	17	64	25	71	150	217	46	518	777	262	−.1	4.4	.3
		1944	18,180	14	58	21	60	140	181	37	447	680	231	−.1	3.7	.3
		1947	18,970	12	82	25	76	211	217	58	583	882	308	7.5	1.7	.4
		1948	18,830	14	70	22	61	167	914	40	489	744	265	7.8	2.4	.4
		1949	19,810	14	71	23	62	175	195	41	498	764	272	7.6	2.6	.3
		1950	15,250	12	75	28	70	179	230	49	559	850	302	7.7	2.2	.3
		1951	13,560	14	79	27	72	185	235	52	578	877	308	−.1	2.2	.4
		1952	24,740	13	68	21	57	174	180	34	465	714	256	−.1	1.9	.3
		1953	12,140	13	81	30	83	185	262	59	627	940	325	−.1	2.9	.3
		1954	8,427	13	98	33	109	201	337	75	774	1,150	380	−.1	3.7	.4
		1955	10,070	15	97	29	91	211	283	64	694	1,030	361	−.1	4.6	.4
		1956	12,040	15	81	24	70	192	212	53	558	846	300	−.1	4.0	.5
		1957	23,930	15	76	20	50	198	159	34	472	722	272	−.1	5.2	.4
		1958	19,640	18	86	20	62	201	199	43	536	822	296	−.1	4.0	.6
		1959	9,311	−1.0	92	29	55	183	−1.0	−1.0	722	1,030	348	−.1	−1.0	−.1
		1960	12,650	−1.0	84	20	72	185	−1.0	−1.0	595	848	291	7.6	−1.0	−.1
		1961	9,177	−1.0	106	27	93	186	−1.0	−1.0	752	1,070	372	7.6	−1.0	−.1
		1962	20,402	−1.0	76	19	57	189	−1.0	−1.0	508	740	266	7.7	−1.0	−.1
		1963	3,453	−1.0	119	40	147	207	−1.0	−1.0	1,000	1,450	459	7.6	−1.0	−.1
		1964	3,319	−1.0	116	33	119	184	−1.0	−1.0	889	1,300	427	7.8	−1.0	−.1
		1965	14,940	−1.0	81	24	79	616	255	57	609	735	300	7.6	−1.0	−.1
		1966	11,390	12	67	22	65	149	209	39	492	764	254	7.8	2.6	−.1
		1967	10,770	11	78	25	84	160	256	57	601	923	298	7.8	3.5	−.1
		1968	11,600	10	83	29	95	170	288	64	657	1,020	328	7.6	4.3	−.1
		1969	12,200	11	81	29	85	169	274	57	627	953	321	7.9	4.3	−.1
		1970	11,900	9.7	78	26	86	167	258	57	605	935	303	8.2	3.8	−.1
		1972	16,400	9.1	71	24	74	158	240	51	555	868	279	7.7	−1.0	.5

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
75	09421500	1940	10,600	13	110	28	98	159	348	77	761	1,140	390	–0.1	3.0	0.3
		1941	16,200	11	110	28	98	153	355	79	766	1,140	390	–.1	3.0	.3
		1942	24,960	12	103	27	98	156	329	72	719	1,080	367	–.1	2.6	.4
		1943	17,260	13	95	26	90	158	303	64	673	1,010	344	–.1	3.2	.3
		1944	19,910	12	92	28	90	159	299	70	679	1,030	344	–.1	3.4	.4
		1951	15,440	13	84	28	90	167	267	72	663	977	324	–.1	–2.0	–.1
		1952	21,600	–1.0	83	27	90	–1.0	–1.0	–1.0	652	974	318	–.1	–1.0	–.1
		1953	19,050	–1.0	83	23	82	–1.0	–1.0	–1.0	632	938	302	–.1	–1.0	–.1
		1954	14,760	–1.0	88	25	90	–1.0	–1.0	–1.0	677	1,010	322	–.1	–1.0	–.1
		1955	12,810	–1.0	102	27	106	–1.0	–1.0	–1.0	778	1,150	366	–.1	–1.0	–.1
		1956	10,770	–1.0	104	32	117	170	–1.0	–1.0	837	1,230	391	–.1	–1.0	–.1
		1957	11,170	–1.0	93	31	110	171	–1.0	–1.0	791	1,170	367	–.1	–1.0	–.1
		1958	16,940	11	87	24	86	158	269	71	661	985	316	–.1	2.9	.3
		1959	13,480	11	84	24	81	158	261	67	622	944	308	–.1	3.2	.3
		1960	12,740	11	88	25	87	158	270	72	656	983	322	–.1	2.5	.2
		1961	11,960	10	92	27	92	160	288	87	694	1,040	340	7.9	3.5	.4
		1962	11,470	12	101	26	98	162	313	88	723	1,090	339	–.1	3.5	.3
		1968	10,800	9.0	87	30	102	159	289	91	690	1,090	339	7.6	2.0	–.1
		1969	11,000	9.2	92	30	114	165	318	96	742	1,140	355	7.8	2.1	.4
		1970	9,240	9.4	88	35	114	168	322	96	749	1,150	364	7.7	2.2	–.1
		1971	17,400	9.5	91	32	111	171	320	96	751	1,160	359	7.8	–1.0	.4
		1972	17,400	9.4	87	30	108	166	310	92	727	1,130	341	7.8	–1.0	.5
76	09502000	1951	612	18	58	21	297	187	65	472	1,050	1,910	231	–.1	2.1	.4
		1952	362	18	48	14	150	153	50	233	611	1,090	178	–.1	2.4	.4
		1953	965	18	42	11	87	146	38	129	406	721	150	–.1	.9	–.1
		1954	699	18	47	12	125	160	43	195	533	954	167	–.1	1.9	–.1
		1955	853	–1.0	51	18	180	172	–1.0	–1.0	709	1,270	201	–.1	–1.0	–.1
		1956	950	–1.0	58	19	228	179	–1.0	–1.0	863	1,540	222	–.1	–1.0	–.1
		1957	601	–1.0	56	20	246	171	–1.0	–1.0	915	1,630	222	–.1	–1.0	–.1
		1958	614	–1.0	56	13	209	165	–1.0	–1.0	784	1,440	193	–.1	–1.0	–.1
		1959	769	–1.0	46	12	164	163	–1.0	–1.0	616	1,110	164	–.1	–1.0	–.1
		1960	554	–1.0	45	10	137	149	–1.0	–1.0	547	963	156	7.7	–1.0	–.1
		1961	782	–1.0	50	11	139	157	–1.0	–1.0	564	1,010	168	7.7	–1.0	–.1
		1962	725	–1.0	54	14	175	169	–1.0	–1.0	683	1,230	191	7.7	–1.0	–.1
		1963	1,108	–1.0	50	12	163	158	–1.0	–1.0	648	1,150	174	7.8	–1.0	–.1
		1964	723	–1.0	50	13	185	164	–1.0	–1.0	693	1,260	179	7.9	–1.0	–.1

		1965	429	–1.0	52	14	202	[illegible]	–1.0	–1.0	755	1,380	190	7.7	–1.0	[illegible]
		1966	1,121	18	41	9.7	108	133	39	162	447	814	142	7.8	.9	–.1
		1967	840	19	45	11	117	148	42	174	483	878	156	7.7	.4	–.1
		1968	1,600	19	46	11	–1.0	149	45	188	508	927	163	7.7	.5	–.1
		1969	990	19	52	11	127	154	49	194	527	942	176	7.9	.8	–.1
		1970	1,120	16	50	12	144	157	53	217	570	1,040	176	8.1	.4	–.1
		1972	1,090	16	54	16	192	169	63	310	742	1,390	202	7.8	.4	–.1
77	09510000	1951	275	23	40	27	28	231	56	20	319	513	211	–.1	1.7	.4
		1952	833	21	34	16	16	171	30	11	221	351	151	–.1	.9	.3
		1953	321	22	45	31	34	259	67	24	354	580	240	–.1	1.5	–.1
		1954	408	22	38	22	26	210	48	17	281	457	186	–.1	.8	–.1
		1955	215	–1.0	44	34	39	275	–1.0	–1.0	370	607	250	–.1	–1.0	–.1
		1956	274	–1.0	49	33	37	281	–1.0	–1.0	372	614	258	–.1	–1.0	–.1
		1957	390	–1.0	36	19	19	186	–1.0	–1.0	242	389	168	–.1	–1.0	–.1
		1958	583	–1.0	38	17	20	193	–1.0	–1.0	245	393	165	–.1	–1.0	–.1
		1959	341	–1.0	44	28	34	252	–1.0	–1.0	343	549	225	–.1	–1.0	–.1
		1960	646	–1.0	36	17	22	187	–1.0	–1.0	241	387	161	7.9	–1.0	–.1
		1961	184	–1.0	51	31	42	–1.0	–1.0	–1.0	389	632	256	8.1	–1.0	–.1
		1962	507	–1.0	41	19	22	200	–1.0	–1.0	255	424	179	7.9	–1.0	–.1
		1963	210	–1.0	52	28	38	268	–1.0	–1.0	365	597	243	8.0	–1.0	–.1
		1964	376	–1.0	48	24	29	244	–1.0	–1.0	324	526	217	8.0	–1.0	–.1
		1965	862	–1.0	35	13	15	164	–1.0	–1.0	208	335	143	7.9	–1.0	–.1
		1966	656	19	35	15	20	172	32	15	222	369	151	8.1	.5	–.1
		1967	513	21	41	22	26	215	49	14	279	465	193	8.1	.3	–.1
		1968	686	21	36	19	20	189	38	11	242	404	169	7.9	1.0	–.1
		1969	582	20	41	16	–1.0	194	36	9.6	242	405	171	8.2	.6	–.1
		1970	169	19	43	29	35	240	61	21	334	542	225	8.5	.5	–.1
		1972	325	18	42	29	32	249	63	20	332	548	223	8.0	–1.0	.3
78	11152500	1952	242	–1.0	–1.0	–1.0	34	214	–1.0	31	–10	603	243	8.0	–1.0	–.1
		1953	367	–1.0	45	20	30	177	–1.0	24	–10	497	195	8.1	–1.0	–.1
		1954	1.2	–1.0	94	46	120	502	–1.0	112	–10	1,340	425	7.8	–1.0	–.1
		1958	689	–1.0	–1.0	–1.0	21	138	–1.0	17	–10	392	151	7.9	–1.0	–.1
		1959	230	–1.0	–1.0	–1.0	22	151	–1.0	20	–10	400	157	7.8	–1.0	–.1
		1960	36	–1.0	–1.0	–1.0	41	215	–1.0	42	–10	605	231	7.9	–1.0	–.1
		1961	1.4	–1.0	–1.0	–1.0	128	494	–1.0	141	–10	1,350	397	7.7	–1.0	–.1
		1962	44	–1.0	–1.0	–1.0	33	177	–1.0	25	–10	534	209	8.2	–1.0	–.1
		1963	598	–1.0	–1.0	–1.0	22	148	–1.0	17	–10	414	163	8.1	–1.0	–.1
		1964	48	–1.0	–1.0	–1.0	26	188	–1.0	25	–10	474	187	7.9	–1.0	–.1
		1965	14	–1.0	–1.0	–1.0	75	356	–1.0	78	–10	1,000	363	8.2	–1.0	–.1
		1966	41	–1.0	–1.0	–1.0	54	272	–1.0	51	–10	817	304	8.2	–1.0	–.1
		1967	215	–1.0	–1.0	–1.0	47	208	–1.0	42	–10	701	271	8.3	–1.0	–.1

Appendix F.—*Annual data on streamf*[illegible]*chemical quality*—Continued

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
78	11152500	1968	33	−1.0	−1.0	−1.0	35	185	−1.0	31	−10	573	199	8.2	3.8	−0.1
		1969	2,060	−1.0	−1.0	−1.0	28	138	−1.0	19	−10	470	172	8.2	−1.0	−.1
79	11303500	1951	3,330	20	19	8.6	34	76	21	48	197	316	76	7.3	1.0	.2
		1952	9,903	14	11	4.8	15	53	11	18	110	167	47	7.2	1.1	−.1
		1953	2,612	18	22	9.6	39	82	27	59	229	381	94	7.2	1.4	.1
		1954	2,371	17	21	8.9	40	79	27	61	232	381	89	7.8	1.4	.2
		1955	1,347	25	32	14	65	117	44	99	353	593	138	7.4	2.9	.2
		1956	8,685	17	14	5.1	19	59	14	26	134	210	56	7.3	1.4	.2
		1957	1,992	24	28	12	57	103	36	83	308	510	120	7.1	2.4	.2
		1958	8,366	19	15	6.2	24	66	18	30	158	245	68	7.1	1.5	.1
		1959	1,718	27	30	14	64	112	47	96	351	575	132	7.3	2.9	.1
		1960	757	32	45	22	103	153	75	163	539	890	203	7.8	3.4	.2
		1961	604	27	46	23	109	151	81	176	545	968	210	7.9	3.6	.2
		1962	2,054	20	28	13	59	101	50	81	321	524	122	7.5	2.7	.2
		1963	4,660	16	18	7.2	33	68	30	44	191	319	76	7.4	2.2	.2
		1964	1,620	−1.0	−1.0	−1.0	69	114	−1.0	101	−10	630	142	7.9	−1.0	−.1
		1965	5,020	−1.0	−1.0	−1.0	32	67	−1.0	43	−10	313	74	7.8	−1.0	−.1
80	11477000	1952	10,500	−1.0	−1.0	−1.0	4.3	72	−1.0	3.2	−10	137	62	7.8	−1.0	−.1
		1953	14,500	−1.0	15	3.8	4.8	63	−1.0	2.9	−10	117	52	7.3	−1.0	−.1
		1954	9,160	−1.0	16	4.5	4.4	70	−1.0	2.4	−10	136	59	7.6	−1.0	−.1
		1955	6,090	−1.0	17	4.8	5.3	72	−1.0	3.8	−10	141	61	7.4	−1.0	−.1
		1956	13,700	−1.0	16	4.3	4.5	68	−1.0	3.1	−10	132	57	7.8	−1.0	−.1
		1957	8,067	−1.0	17	5.7	4.9	76	−1.0	2.5	−10	147	67	7.3	−1.0	−.1
		1958	19,020	−1.0	−1.0	−1.0	4.5	61	−1.0	3.3	−10	120	53	7.5	−1.0	−.1
		1959	2,525	−1.0	−1.0	−1.0	4.8	81	−1.0	4.4	−10	188	82	7.7	−1.0	−.1
		1960	13,300	−1.0	−1.0	−1.0	4.0	73	−1.0	7.2	−10	163	76	7.4	−1.0	−.1
		1961	4,230	−1.0	−1.0	−1.0	5.3	85	−1.0	4.3	−10	171	76	8.0	−1.0	−.1
		1962	4,260	−1.0	−1.0	−1.0	5.0	71	−1.0	3.4	−10	134	59	7.7	−1.0	−.1
		1963	10,170	−1.0	−1.0	−1.0	5.7	−1.0	−1.0	−1.0	−10	134	−10	−.1	−1.0	−.1
		1964	2,130	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	173	−10	−.1	−1.0	−.1
		1965	4,760	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	155	−10	−.1	−1.0	−.1
		1966	5,150	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	165	−10	−.1	−1.0	−.1
		1967	5,750	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	183	−10	−.1	−1.0	−.1
		1968	7,500	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	134	−10	−.1	−1.0	−.1
		1969	21,600	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	114	−10	−.1	−1.0	−.1

		1970	3,510	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	159	−10	−.1	−1.0	−.1
		1971	10,000	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	166	−10	−.1	−1.0	−.1
81	11530500	1952	3,200	−1.0	−1.0	−1.0	3.6	60	−1.0	2.9	−10	116	50	7.4	−1.0	−.1
		1953	30,800	−1.0	12	5.4	4.6	64	−1.0	2.5	−10	117	51	7.5	−1.0	−.1
		1954	26,400	−1.0	12	5.1	3.6	61	−1.0	1.4	−10	113	50	7.7	−1.0	−.1
		1955	11,300	−1.0	14	5.9	4.6	71	−1.0	3.1	−10	131	58	7.5	−1.0	−.1
		1956	26,000	−1.0	13	5.6	5.2	71	−1.0	1.2	−10	130	56	7.6	−1.0	−.1
		1957	18,300	−1.0	9.6	4.9	5.8	54	−1.0	3.5	−10	112	46	7.1	−1.0	−.1
		1958	27,200	−1.0	−1.0	−1.0	4.7	66	−1.0	2.9	−10	122	52	7.5	−1.0	−.1
		1959	13,100	−1.0	−1.0	−1.0	4.9	71	−1.0	3.1	−10	134	61	7.8	−1.0	−.1
		1960	16,900	−1.0	−1.0	−1.0	3.5	65	−1.0	3.5	−10	121	55	7.6	−1.0	−.1
		1961	12,300	−1.0	−1.0	−1.0	4.3	71	−1.0	3.9	−10	135	58	7.9	−1.0	−.1
		1962	10,300	−1.0	−1.0	−1.0	6.8	73	−1.0	2.6	−10	141	59	7.9	−1.0	−.1
		1963	22,100	−1.0	−1.0	−1.0	4.6	69	−1.0	2.6	−10	126	56	7.9	−1.0	−.1
		1964	17,000	−1.0	−1.0	−1.0	4.4	61	−1.0	2.3	−10	120	53	7.9	−1.0	−.1
		1965	15,300	−1.0	−1.0	−1.0	5.3	70	−1.0	2.3	−10	139	59	8.0	−1.0	−.1
		1966	14,300	−1.0	−1.0	−1.0	5.5	79	−1.0	1.9	−10	154	67	8.1	−1.0	−.1
		1967	16,500	14	15	6.5	4.8	74	7.9	1.7	87	139	63	8.0	.5	.1
		1968	11,900	14	15	6.7	5.2	75	11	2.7	95	149	66	7.7	1.1	.0
		1969	22,530	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	136	−10	−.1	−1.0	−.1
		1970	13,600	16	16	7.2	6.4	84	9.9	2.5	101	161	70	7.8	.7	.1
		1971	23,000	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	136	−10	−.1	−1.0	−.1
82	12031000	1960	4,320	15	5.0	2.1	4.0	23	3.0	3.3	51	59	18	6.9	1.0	.0
		1962	3,490	15	5.0	1.2	3.9	21	3.3	3.3	47	56	17	6.9	1.2	.1
		1963	4,050	15	4.8	1.4	3.3	22	3.0	3.2	51	55	18	6.9	1.3	.1
		1964	2,640	15	4.8	1.7	4.0	24	2.9	3.4	50	58	19	6.9	1.2	.1
		1966	3,790	13	4.4	1.5	3.9	22	3.3	3.8	46	57	17	6.6	1.3	.1
		1967	3,280	15	5.3	1.7	4.1	25	3.2	3.9	49	61	20	7.1	1.5	.0
		1968	2,540	16	5.7	1.9	4.6	28	3.3	3.7	54	67	22	7.1	.8	.1
		1969	4,280	15	4.6	1.6	4.0	23	2.6	2.7	53	57	18	7.0	1.5	.0
		1970	2,330	16	5.9	2.0	4.7	29	3.5	3.7	55	71	23	7.1	1.8	.1
		1971	5,220	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	55	−10	6.9	−1.0	−.1
83	12200500	1960	16,500	6.7	7.0	.9	1.0	25	3.7	.4	35	52	21	7.2	.5	.1
		1961	18,800	6.3	6.5	1.1	1.1	25	4.0	.3	36	50	21	7.2	.3	.1
		1962	16,600	6.6	6.5	1.1	1.2	24	4.1	.4	36	50	20	7.1	.4	.1
		1963	19,900	6.1	6.5	.9	1.1	24	3.5	.2	36	48	20	7.0	.3	.1
		1964	21,700	5.5	6.3	1.1	1.2	24	3.8	.3	31	48	20	7.2	.5	.1
		1965	14,800	6.2	7.1	1.4	1.4	27	4.4	.5	37	55	23	7.1	.4	.1
		1966	16,800	5.7	6.4	1.1	1.2	24	4.1	.4	33	50	20	7.0	.3	.1
		1967	17,300	6.1	6.7	1.2	1.2	25	4.2	.4	35	51	22	7.2	.4	.1

Appendix F.—Annual data on streamflow chemical quality—Continued

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
83	12200500	1968	18,800	6.1	6.3	1.2	1.2	25	3.9	0.5	34	49	21	7.2	0.2	0.1
		1969	16,800	5.7	6.4	1.2	1.1	24	4.0	.4	33	49	21	7.1	.4	.1
		1970	13,200	5.9	6.3	1.2	1.2	24	4.1	.5	35	51	21	7.2	.4	.1
84	12433000	1960	8,840	10	11	3.6	2.3	47	7.4	1.2	62	98	42	7.3	1.1	.1
		1961	9,120	10	11	3.3	2.4	44	7.6	1.1	65	95	40	7.3	1.3	.1
		1962	7,030	10	12	9.0	2.6	47	9.2	1.4	72	108	46	7.2	1.4	.2
		1963	6,330	9.7	12	4.1	2.4	51	9.2	1.2	71	108	47	7.2	1.1	.2
		1964	7,880	9.0	12	4.2	2.7	48	10	1.7	68	107	46	7.2	1.2	.2
		1965	10,700	10	9.9	3.4	2.7	40	9.4	1.1	65	93	39	6.9	1.5	.2
		1966	5,170	9.0	14	4.9	3.4	58	11	2.1	79	129	56	7.1	1.6	.3
		1967	8,130	9.8	11	3.8	2.8	45	10	1.3	65	103	43	7.1	1.3	.3
		1968	6,540	8.4	12	4.1	2.8	48	10	1.5	70	107	46	7.3	1.2	.4
		1969	9,070	10	10	3.5	2.8	42	9.3	1.2	68	98	40	7.3	1.3	.2
		1970	6,860	10	11	3.8	3.0	45	11	1.6	68	106	44	7.3	1.6	.2
		1971	10,500	−1.0	9.7	3.2	2.3	42	7.8	1.2	−10	89	38	7.2	−1.0	−.1
85	12510500	1953	3,420	26	20	8.1	14	114	13	4.6	144	220	83	−.1	1.9	.3
		1954	4,269	23	18	6.4	12	100	10	4.1	129	193	71	−.1	1.7	.2
		1955	3,068	−1.0	21	7.4	14	115	13	4.6	147	225	83	−.1	2.1	−.1
		1956	7,055	−1.0	16	6.1	10	87	9.4	3.6	115	170	65	−.1	1.3	−.1
		1957	3,864	−1.0	−1.0	−1.0	12	100	−1.0	−1.0	129	196	76	−.1	−1.0	−.1
		1958	2,957	−1.0	−1.0	−1.0	15	122	−1.0	−1.0	153	237	89	−.1	−1.0	−.1
		1959	4,307	−1.0	−1.0	−1.0	11	98	−1.0	−1.0	125	192	74	−.1	−1.0	−.1
		1960	4,020	−1.0	−1.0	−1.0	11	93	−1.0	−1.0	121	184	69	7.5	−1.0	−.1
		1961	4,220	−1.0	−1.0	−1.0	11	−1.0	−1.0	−1.0	129	192	73	7.8	−1.0	−.1
		1962	2,752	24	23	8.3	15	123	15	5.3	158	245	91	7.8	2.3	.2
		1963	3,323	23	22	7.4	14	114	13	4.5	146	222	84	7.8	1.9	.2
		1964	2,474	24	25	9.0	16	133	17	5.5	169	261	100	7.7	2.4	.2
		1965	4,210	20	20	7.1	12	104	13	4.0	134	206	78	7.8	2.2	.2
		1966	2,192	25	27	12	19	147	19	6.4	185	294	110	7.7	3.6	.3
		1967	2,938	23	23	8.1	15	123	15	5.0	158	244	91	7.4	2.9	.2
		1968	3,440	22	20	7.1	13	106	12	4.0	140	209	78	8.0	2.1	.2
		1969	4,030	22	20	7.0	12	105	12	3.8	139	207	78	7.9	2.2	.1
		1970	2,840	25	25	9.3	16	133	17	5.5	172	270	101	7.6	3.8	.2
		1971	4,670	−1.0	18	6.2	11	97	14	3.5	−10	186	72	7.6	−1.0	−.1

86	13154500	1951	11,900	31	47	19	30	207	51	24	310	492	193	7.9	3.2	.6
		1952	13,900	31	46	19	29	208	50	24	309	486	193	7.9	2.9	.6
		1953	10,330	34	47	21	33	214	57	28	330	525	204	−.1	3.0	−.1
		1954	9,400	35	47	21	34	219	58	28	334	531	204	7.9	3.2	−.1
		1955	9,455	36	47	20	33	216	56	27	324	527	200	8.0	3.2	−.1
		1956	11,800	−1.0	47	19	31	211	53	24	318	506	196	8.1	2.7	−.1
		1957	11,140	−1.0	48	19	31	212	54	24	317	511	198	7.8	3.2	−.1
		1958	9,772	−1.0	49	19	32	214	55	25	325	515	203	7.9	3.4	−.1
		1959	8,655	−1.0	−1.0	−1.0	33	218	−1.0	−1.0	332	525	204	7.9	−1.0	−.1
		1960	8,368	−1.0	−1.0	−1.0	33	214	−1.0	−1.0	327	520	197	8.0	−1.0	−.1
		1961	7,457	−1.0	−1.0	−1.0	34	212	−1.0	−1.0	326	513	195	8.2	−1.0	−.1
		1962	8,434	−1.0	−1.0	−1.0	33	212	−1.0	−1.0	322	512	194	8.1	−1.0	−.1
		1963	9,340	−1.0	−1.0	−1.0	33	217	−1.0	−1.0	329	514	204	8.2	−1.0	−.1
		1964	10,130	−1.0	−1.0	−1.0	32	219	−1.0	−1.0	328	518	205	8.0	−1.0	−.1
		1965	12,503	−1.0	−1.0	−1.0	29	208	−1.0	−1.0	312	499	198	8.1	−1.0	−.1
		1966	10,590	−1.0	−1.0	−1.0	31	220	−1.0	−1.0	316	510	200	8.1	−1.0	−.1
		1967	8,451	−1.0	44	21	34	216	−1.0	−1.0	330	526	205	8.3	−1.0	−.1
		1968	9,450	−1.0	47	21	33	222	−1.0	−1.0	328	528	203	8.3	−1.0	−.1
		1969	11,900	−1.0	46	18	29	205	−1.0	−1.0	304	497	190	8.3	−1.0	−.1
		1971	14,300	−1.0	45	18	26	210	43	21	280	470	187	8.1	−1.0	−.1
87	13212500	1951	1,924	21	19	4.8	21	97	26	6.2	154	226	67	7.3	3.2	.4
		1952	2,225	20	18	5.0	19	90	22	5.5	142	206	65	7.4	2.4	.4
		1953	1,402	21	23	6.4	29	118	36	9.3	190	285	83	−.1	2.3	−.1
		1954	1,104	23	28	7.4	34	141	42	10	221	336	100	7.6	2.5	−.1
		1955	386	36	49	14	75	265	93	22	427	655	180	7.9	3.8	−.1
		1956	2,173	−1.0	19	4.2	20	94	23	5.8	147	218	65	7.4	2.0	−.1
		1957	1,948	−1.0	22	4.9	23	109	28	6.3	166	249	75	7.4	2.1	−.1
		1958	1,775	−1.0	25	5.1	25	119	29	7.1	178	270	84	7.5	2.5	−.1
		1959	546	−1.0	−1.0	−1.0	62	253	−1.0	−1.0	386	592	177	7.8	−1.0	−.1
		1960	805	−1.0	−1.0	−1.0	49	191	−1.0	−1.0	289	448	124	7.6	−1.0	−.1
		1961	379	−1.0	−1.0	−1.0	77	277	−1.0	−1.0	436	660	185	7.7	−1.0	−.1
		1962	423	−1.0	−1.0	−1.0	70	256	−1.0	−1.0	401	617	168	7.7	−1.0	−.1
		1963	845	−1.0	−1.0	−1.0	43	175	−1.0	−1.0	268	402	117	7.7	−1.0	−.1
		1964	1,001	−1.0	−1.0	−1.0	40	166	−1.0	−1.0	253	386	112	7.5	−1.0	−.1
		1965	3,152	−1.0	−1.0	−1.0	17	84	−1.0	−1.0	130	189	59	7.4	−1.0	−.1
		1966	596	−1.0	−1.0	−1.0	61	237	−1.0	−1.0	−10	555	155	7.9	−1.0	−.1
		1967	580	−1.0	40	11	55	220	−1.0	−1.0	329	516	145	7.8	−1.0	−.1
		1968	502	−1.0	44	13	62	247	−1.0	−1.0	362	568	162	8.0	−1.0	−.1
		1969	1,770	−1.0	22	5.3	24	113	−1.0	−1.0	165	255	76	8.0	−1.0	−.1
		1970	1,970	8.8	19	4.7	23	86	−1.0	6.7	150	238	70	8.4	−1.0	.4
		1971	3,590	−1.0	16	3.6	16	85	14	3.8	117	179	55	7.8	−1.0	−.1

Appendix F.—*Annual data on streamflow chemical quality*—Continued

Code number	Station	Year	Q	SiO_2	Ca	Mg	Na	HCO_3	SO_4	Cl	DS	Ksc	HRD	pH	NO_3	F
88	50071000	1962	37	26	−1.0	−1.0	−1.0	−1.0	−1.0	10	−10	113	−10	7.3	−1.0	0.0
		1963	44	23	6.0	2.7	10	38	2.2	10	−10	104	26	7.4	.6	.0
		1964	26	21	6.0	4.0	8.8	42	1.5	11	−10	108	32	7.1	.2	.0
		1965	37	23	6.5	4.4	8.8	42	.8	11	80	112	33	7.2	1.4	.1
		1966	33	24	6.2	4.4	8.8	42	2.5	11	77	110	34	7.2	.2	.1
		1967	34	20	5.4	4.9	7.7	38	2.5	12	−10	107	34	7.3	.4	.0
		1968	28	23	6.9	3.9	9.4	44	2.3	12	80	114	33	7.3	.1	.0
		1969	43	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−1.0	−10	114	−10	7.3	.6	−.1
		1970	48	22	10	3.3	8.9	48	3.6	12	84	127	40	7.3	.5	.0
		1971	32	25	7.5	3.8	10	43	4.6	12	87	115	35	7.2	.5	.1
		1972	44	19	6.4	3.4	9.7	35	4.6	14	77	106	30	7.8	.0	.1

Appendix F.—Explanation of notation

Q	- annual mean discharge in cubic feet per second computed using discharge values that represent flow conditions associated with specific samples (either composited or grab) obtained for analysis of water quality (refer to appendix B-2 for type of sample for this computation and subsequent computations of chemical concentrations)
SiO_2	- annual mean silica concentration in milligrams per litre (mg/l)
Ca	- annual mean calcium concentration in mg/l
Mg	- annual mean magnesium concentration in mg/l
Na	- annual mean sodium concentration in mg/l
HCO_3	- annual mean bicarbonate concentration in mg/l
SO_4	- annual mean sulfate concentration in mg/l
Cl	- annual mean chloride concentration in mg/l
DS	- annual mean dissolved solids concentration in mg/l
Ksc	- annual mean specific conductance in micromhos per centimeter at 25°C
HRD	- annual mean total hardness concentration in mg/l of calcium carbonate
pH	- annual mean pH expressed as average of reported pH values
NO_3'	- annual mean nitrate concentration in mg/l
F	- annual mean fluoride concentration in mg/l
−.1, −1.0, −10	- indicate that no data were available

Annual values are discharge-weighted except for Survey station numbers 02376600 and 03277200 (code numbers 22 and 23, respectively).

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
01184000	1953	43674	18633	00712	01
01184000	1954	47300	18388	-0084	02
01184000	1956	42878	19294	00279	03
01184000	1966	41847	19638	00232	04
01184000	1967	39895	20755	-0326	05
01184000	1968	43802	20128	-0820	06
01184000	1969	42718	19731	-0112	07
01184000	1970	42041	19912	-0099	08
01184000	1971	41614	19731	00205	09
01463500	1945	41691	20294	00224	1
01463500	1946	41206	20719	-0032	2
01463500	1947	41268	20492	00173	3
01463500	1948	41119	20755	-0039	4
01463500	1949	40402	20899	00067	5
01463500	1950	40453	20569	00379	6
01463500	1951	41682	20492	00029	7
01463500	1952	42460	20569	-0318	8
01463500	1953	41523	20607	-0030	9
01463500	1954	39633	20969	00263	10
01463500	1955	40899	20899	-0106	11
01463500	1956	41875	20607	-0153	12
01463500	1957	39315	21335	00008	13
01463500	1958	41271	20569	00095	14
01463500	1959	39827	21430	-0265	15
01463500	1960	41673	20492	00032	16
01463500	1961	40253	21004	00014	17
01463500	1962	39143	21399	00004	18
01463500	1963	39170	21553	-0160	19
01463500	1964	39340	21553	-0219	20
01463500	1966	39299	21399	-0050	21
01474500	1946	35051	24216	00430	1
01474500	1947	33674	24393	00514	2
01474500	1948	34409	24216	00552	3
01474500	1949	33962	24216	00637	4
01474500	1950	33263	24456	00530	5
01474500	1951	34955	24409	00255	6
01474500	1952	36075	24314	00138	7
01474500	1953	36284	24486	-0479	8
01474500	1954	32601	24564	00548	9
01474500	1955	33424	25065	-0110	10
01474500	1956	34928	24669	00001	11
01474500	1957	32833	24683	00384	12
01474500	1958	34639	24216	00508	13
01474500	1959	32529	24886	00240	14
01474500	1960	34216	24346	00459	15
01474500	1961	33598	24609	00313	16
01474500	1962	32672	24800	00298	17
01474500	1963	33404	25441	-0482	18
01474500	1964	33892	25038	-0172	19
01474500	1965	31106	25911	-0515	20
01474500	1966	31072	25011	00391	21
01474500	1967	33838	25353	-0477	22
01474500	1968	33181	25263	-0262	23
01474500	1969	33579	26928	-2003	24

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
01474500	1970	32900	25798	-0743	25
01474500	1971	33617	25172	-0254	26
01474500	1972	35340	25065	-0474	27
01491000	1965	18388	20000	00306	01
01491000	1966	14314	20934	00108	02
01491000	1967	21553	20086	-0353	03
01491000	1968	22330	19136	00455	04
01491000	1969	19085	20682	-0502	05
01491000	1970	22122	19777	-0147	06
01491000	1971	19956	20212	-0190	07
01491000	1972	21367	19445	00322	08
01673000	1952	30414	17160	00551	01
01673000	1953	22529	17993	00441	02
01673000	1955	13979	19445	-0226	03
01673000	1956	30128	17853	-0116	04
01673000	1968	28189	17160	00755	05
01673000	1970	28176	18573	-0657	06
01673000	1971	30492	18451	-0748	07
02083500	1954	33481	19031	-0717	1
02083500	1962	33711	18129	00147	2
02083500	1963	32504	18513	-0039	3
02083500	1964	32856	18388	-0027	4
02083500	1965	34298	18062	00119	5
02083500	1966	31644	18573	00041	6
02083500	1967	30607	19031	-0248	7
02083500	1968	33906	17782	00595	8
02083500	1970	27709	19243	00014	9
02083500	1972	25877	19494	00062	10
02129000	1962	39304	18573	00405	1
02129000	1963	38633	19138	-0019	2
02129000	1964	38733	18976	00122	3
02129000	1965	40086	18692	00120	4
02129000	1966	37582	19395	-0054	5
02129000	1967	36415	19912	-0324	6
02129000	1969	37536	19138	00213	7
02129000	1970	39101	19031	-0010	8
02129000	1971	40569	19031	-0320	9
02129000	1972	41523	18633	-0124	10
02252500	1955	13222	27945	00242	1
02252500	1956	10000	28395	00533	2
02252500	1957	14914	27752	00046	3
02252500	1958	11461	27582	01010	4
02252500	1959	21004	24377	02022	5
02252500	1960	20755	26355	00101	6
02252500	1961	12041	29294	-0836	7
02252500	1963	09243	28020	01019	8
02252500	1964	15563	27716	-0067	9
02252500	1967	11761	29571	-1048	10
02252500	1968	21367	25705	00610	11
02252500	1969	15051	28248	-0481	12
02252500	1970	18129	30212	-3152	13

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
02253000	1955	15798	28041	02342	1
02253000	1956	15682	29987	00434	2
02253000	1957	19395	29206	-0005	3
02253000	1958	17559	29908	-0103	4
02253000	1959	18062	28525	01115	5
02253000	1960	24914	25611	01779	6
02253000	1961	18808	30374	-0980	7
02253000	1962	18865	30414	-1038	8
02253000	1963	17559	30128	-0323	9
02253000	1964	21553	27160	01333	10
02253000	1966	19031	30864	-1542	11
02253000	1967	16721	30719	-0639	12
02253000	1968	23263	27364	00568	13
02253000	1969	20864	29489	-0769	14
02253000	1970	22330	30414	-2716	15
02253500	1955	16335	29935	-1017	1
02253500	1956	13802	30128	-1152	2
02253500	1957	15441	28228	00322	3
02253500	1958	11139	28235	01434	4
02253500	1959	21584	24048	02905	5
02253500	1960	20969	27267	-0154	6
02253500	1961	12041	29943	-0509	7
02253500	1962	12304	28028	01338	8
02253500	1963	12041	29133	00301	9
02253500	1964	17853	26812	01110	10
02253500	1966	19590	31430	-3959	11
02253500	1967	13617	29773	-0749	12
02253500	1968	21614	26385	00560	13
02253500	1969	14150	29325	-0439	14
02253500	1970	21614	26928	00009	15
02256500	1962	23979	17634	01857	01
02256500	1963	17243	20253	00930	02
02256500	1964	28209	18692	-0262	03
02256500	1965	-0458	25563	00062	04
02256500	1966	19395	21461	-0819	05
02256500	1967	18195	20828	00116	06
02256500	1971	20899	22148	-1884	07
02296750	1959	33493	20414	-0132	01
02296750	1961	28267	23617	-0139	02
02296750	1962	30934	21303	00783	03
02296750	1963	29542	22625	00188	04
02296750	1964	29899	23010	-0384	05
02296750	1966	30755	22529	-0349	06
02296750	1967	27482	23856	00032	07
02313000	1950	31644	24298	-0785	01
02313000	1951	30500	24133	-0297	02
02313000	1959	33444	23096	-0094	03
02313000	1960	35786	21761	00579	04
02313000	1961	32900	23181	-0024	05
02313000	1962	26609	25065	-0127	06

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
02313000	1963	26021	24533	00571	07
02313000	1964	32923	23032	00118	08
02313000	1966	29782	23979	00060	09
02320500	1954	36435	23674	-0549	01
02320500	1955	32900	24742	-0571	02
02320500	1956	34757	23522	00099	03
02320500	1957	36191	22455	00741	04
02320500	1960	38820	22718	-0301	05
02320500	1961	37952	22355	00319	06
02320500	1962	36304	23464	-0301	07
02320500	1966	41303	22742	-1060	08
02320500	1967	38710	20828	01622	09
02321500	1957	25211	19638	-0137	01
02321500	1958	26170	19138	-0004	02
02321500	1959	29791	17634	00117	03
02321500	1960	28663	17782	00401	04
02321500	1966	34298	16232	-0203	05
02321500	1971	25551	19542	-0171	06
02489500	1963	35353	18451	00299	01
02489500	1964	38681	17993	00059	02
02489500	1965	39253	18062	-0129	03
02489500	1966	40086	17559	00200	04
02489500	1967	36345	18195	00347	05
02489500	1968	38513	18062	00026	06
02489500	1969	36138	18865	-0280	07
02489500	1970	36946	18921	-0505	08
03251500	1953	33383	22788	00407	1
03251500	1960	33729	23385	-0256	2
03251500	1961	36812	22625	-0084	3
03251500	1962	35478	22355	00440	4
03251500	1963	33962	23181	-0097	5
03251500	1964	33522	22878	00290	6
03251500	1965	35798	22553	00181	7
03251500	1968	37490	22577	-0166	8
03251500	1969	33139	23838	-0597	9
03251500	1971	37451	22480	-0061	10
03251500	1972	36609	22625	-0045	11
05054000	1956	26464	26684	00459	1
05054000	1957	26920	27604	-0463	2
05054000	1958	26325	27803	-0660	3
05054000	1959	25051	26693	00454	4
05054000	1960	26454	26794	00349	5
05054000	1961	23284	26946	00207	6
05054000	1962	32445	26857	00266	7
05054000	1963	27536	27810	-0671	8
05054000	1964	25911	27482	-0337	9
05054000	1965	29978	27267	-0136	10
05054000	1966	31031	27177	-0049	11
05054000	1967	29450	27435	-0302	12
05054000	1968	24983	27202	-0054	13
05054000	1969	31673	26474	00652	14

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
05054000	1970	25832	27067	00078	15
05054000	1971	24814	26767	00381	16
05054000	1972	30792	27316	-0187	17
05082500	1957	33755	27168	00022	1
05082500	1958	32695	27543	-0258	2
05082500	1959	36098	27466	-0485	3
05082500	1960	32240	27110	00217	4
05082500	1961	28825	27664	-0032	5
05082500	1962	37327	26821	00050	6
05082500	1963	34050	27160	00004	7
05082500	1964	33038	27380	-0125	8
05082500	1965	36631	26839	00094	9
05082500	1966	37818	26739	00088	10
05082500	1967	36093	27126	-0145	11
05082500	1968	32648	27292	-0002	12
05082500	1969	37096	26571	00323	13
05082500	1970	35922	26928	00068	14
05082500	1971	33222	26902	00337	15
05082500	1972	37101	27050	-0159	16
05124000	1955	28028	28432	-0446	1
05124000	1956	27945	28202	-0202	2
05124000	1957	18910	29340	00141	3
05124000	1958	15843	30170	-0187	4
05124000	1959	11004	30934	-0158	5
05124000	1960	24216	27796	00815	6
05124000	1961	10128	30719	00201	7
05124000	1962	07853	31173	00120	8
05124000	1963	16263	29965	-0050	9
05124000	1964	17649	29586	00102	10
05124000	1967	20934	29253	-0104	11
05124000	1968	16628	29903	-0048	12
05124000	1969	31367	26599	00840	13
05124000	1970	27308	28733	-0629	14
05124000	1971	24518	28960	-0398	15
06185500	1966	40763	28129	00117	01
06185500	1967	40931	27931	00316	02
06185500	1968	40374	28162	00081	03
06185500	1969	41271	28116	00133	04
06185500	1970	40682	28149	00096	05
06185500	1971	41139	28142	00106	06
06185500	1972	40531	28007	00237	07
06214500	1951	39562	24065	00044	1
06214500	1952	39104	24346	-0011	2
06214500	1953	37790	24742	00237	3
06214500	1954	38006	24518	00356	4
06214500	1955	37284	25051	00176	5
06214500	1956	39071	24330	00021	6
06214500	1957	39277	24548	-0299	7
06214500	1958	37764	24969	00023	8
06214500	1964	39258	24502	-0244	9
06214500	1965	39672	24082	-0027	10
06214500	1966	37739	24857	00147	11

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
06214500	1967	39709	24200	-0162	12
06214500	1968	39355	24249	-0038	13
06214500	1969	38837	24377	00088	14
06214500	1970	36031	26243	-0400	15
06214500	1971	39430	23997	00178	16
06214500	1972	39680	23838	00213	17
06294700	1951	37680	28470	00521	1
06294700	1952	35083	29633	00222	2
06294700	1953	34542	30170	-0135	3
06294700	1954	34376	30212	-0122	4
06294700	1955	34783	30170	-0215	5
06294700	1956	35013	30043	-0165	6
06294700	1957	36761	39243	00053	7
06294700	1958	35895	29533	00052	8
06294700	1959	34621	30253	-0244	9
06294700	1960	33471	30531	-0139	10
06294700	1961	32103	31173	-0326	11
06294700	1962	36052	29717	-0185	12
06294700	1963	36174	39494	-0002	13
06294700	1964	36702	29435	-0119	14
06294700	1965	37388	38987	00101	15
06294700	1966	32335	29827	00942	16
06294700	1967	36432	39595	-0189	17
06294700	1968	36656	29320	00012	18
06294700	1969	35988	39513	00040	19
06294700	1970	35575	29850	-0159	20
06294700	1971	37218	39180	-0036	21
06294700	1972	36866	29180	00081	22
06308500	1951	25539	28048	00414	1
06308500	1952	26955	27723	00588	2
06308500	1953	25105	28287	00222	3
06308500	1954	23263	27292	01414	4
06308500	1955	25353	28287	00196	5
06308500	1956	25185	28261	00239	6
06308500	1957	26159	27716	00680	7
06308500	1958	24281	28549	00048	8
06308500	1959	25821	28704	-0272	9
06308500	1960	22742	28965	-0204	10
06308500	1961	27574	30000	-1755	11
06308500	1962	26693	27839	00500	12
06308500	1963	27752	27513	00713	13
06308500	1964	26902	27582	00735	14
06308500	1965	27789	28254	-0032	15
06308500	1966	23324	29450	-0751	16
06308500	1967	27649	28028	00209	17
06308500	1968	28182	28007	00173	18
06308500	1969	27803	28370	-0149	19
06308500	1970	23674	29795	-1134	20
06308500	1971	27559	28865	-0618	21
06308500	1972	26212	29581	-1190	22

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
06329500	1951	41858	27177	00523	1
06329500	1952	41163	27490	00400	2
06329500	1953	39755	28228	00046	3
06329500	1954	39702	28156	00133	4
06329500	1955	39536	28585	-0251	5
06329500	1956	40737	27803	00203	6
06329500	1957	41377	27716	00115	7
06329500	1958	40082	28248	-0063	8
06329500	1959	40306	28035	00089	9
06329500	1960	38803	28426	00108	10
06329500	1961	37697	28808	00029	11
06329500	1962	41596	28274	-0503	12
06329500	1963	41245	28075	-0208	13
06329500	1964	41303	27803	00048	14
06329500	1965	42393	27589	-0036	15
06329500	1966	39089	28215	00241	16
06329500	1967	41878	28007	-0313	17
06329500	1968	41761	27839	-0113	18
06329500	1969	41239	27966	-0097	19
06329500	1970	39832	28971	-0717	20
06329500	1971	42041	27226	00423	21
06329500	1972	41673	28035	-0285	22
06478500	1960	28621	27016	01467	01
06478500	1961	18573	30294	01340	02
06478500	1962	33636	27101	-0192	03
06478500	1963	23464	31173	-1073	04
06478500	1964	22304	31367	-0903	05
06478500	1968	18865	31761	-0218	06
06478500	1969	26075	29703	-0422	07
06892500	1962	40686	27782	-1348	01
06892500	1963	35682	29217	-0879	02
06892500	1964	33304	29212	00031	03
06892500	1965	40682	25611	00824	04
06892500	1966	36042	27889	00312	05
06892500	1967	38842	25944	01191	06
06892500	1968	37796	27218	00315	07
06892500	1969	40607	26542	-0078	08
06892500	1970	40294	26839	-0257	09
06892500	1971	37818	27627	-0102	10
06807000	1951	47810	27597	00483	1
06807000	1952	47648	27931	00166	2
06807000	1953	45952	28432	-0162	3
06807000	1954	45001	28274	00094	4
06807000	1955	44385	28603	-0172	5
06807000	1956	44323	28488	-0050	6
06807000	1957	44043	28075	00391	7
06807000	1958	44442	28109	00316	8
06807000	1959	44468	28241	00182	9
06807000	1960	45189	27709	00640	10
06807000	1961	44501	28312	00107	11
06807000	1962	45147	27832	00521	12
06807000	1963	44495	28802	-0382	13
06807000	1964	44556	28633	-0219	14

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
06807000	1965	45308	28312	00024	15
06807000	1966	45438	28739	-0416	16
06807000	1968	45185	28837	-0487	17
06807000	1969	46730	28035	00156	18
06807000	1970	45705	28609	-0313	19
06807000	1971	46454	28555	-0336	20
06807000	1972	46580	28733	-0527	21
06877600	1956	24669	31614	00705	1
06877600	1957	33410	28142	00816	2
06877600	1958	23598	29680	-0794	3
06877600	1962	34079	30531	-1829	4
06877600	1963	29284	32380	-1836	5
06877600	1964	26522	32304	-0698	6
06877600	1965	30874	28893	01040	7
06877600	1966	27218	31461	-0123	8
06877600	1967	30273	28241	01923	9
06877600	1968	27396	32279	-1008	10
06877600	1969	33389	27846	01122	11
06877600	1970	29074	29948	00678	12
06887000	1956	27536	25694	00057	1
06887000	1957	30959	24200	01281	2
06887000	1958	33869	24533	00718	3
06887000	1962	34757	26064	-0883	4
06887000	1963	31072	26693	-1222	5
06887000	1964	32201	25752	-0369	6
06887000	1965	35289	23997	01142	7
06887000	1966	30531	25092	00422	8
06887000	1967	27875	25276	00448	9
06887000	1968	33766	25705	-0447	10
06887000	1969	36464	25079	-0033	11
06887000	1970	27093	26243	-0457	12
06887000	1971	33464	25933	-0650	13
07139500	1962	20086	33997	-1289	01
07139500	1963	16902	31644	-0136	02
07139500	1964	18865	29996	02252	03
07139500	1966	24133	34183	00049	04
07139500	1967	21271	34082	-0929	05
07139500	1969	20294	33747	-0962	06
07139500	1970	23464	32967	01013	07
07146500	1952	32810	32529	-1625	1
07146500	1953	28129	33139	-0598	2
07146500	1954	26599	33483	-0408	3
07146500	1955	28109	31847	00701	4
07146500	1956	27966	32068	00529	5
07146500	1957	34564	29315	00976	6
07146500	1958	35132	30531	-0439	7
07146500	1959	32279	32014	-0925	8
07146500	1960	35092	30334	-0229	9
07146500	1961	34232	30170	00236	10
07146500	1962	34472	30000	00323	11
07146500	1963	30674	31461	00189	12
07146500	1964	29020	31303	00926	13

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
07146500	1965	35002	29243	00894	14
07146500	1966	30693	33096	-1452	15
07146500	1967	31239	30569	00884	16
07146500	1968	30000	31732	00154	17
07146500	1969	33927	30414	00099	18
07146500	1970	31987	31761	-0569	19
07146500	1971	30374	31430	00325	20
07161000	1953	23711	39042	-0088	1
07161000	1954	24843	38382	00120	2
07161000	1955	31300	35563	00360	3
07161000	1956	27348	34969	02532	4
07161000	1957	35378	33945	00350	5
07161000	1958	29777	37709	-1177	6
07161000	1959	28420	37396	-0322	7
07161000	1960	34314	35391	-0671	8
07161000	1961	31614	35843	-0045	9
07161000	1962	31271	36021	-0086	10
07161000	1963	29680	36964	-0393	11
07161000	1965	32380	34200	01292	12
07161000	1966	25694	39694	-1532	13
07161000	1967	27110	37007	00590	14
07161000	1968	27404	38407	-0928	15
07161000	1969	30253	36990	00648	16
07161000	1970	25966	38482	-0428	17
07161000	1971	25105	37324	01073	18
07161000	1953	23711	39042	-0187	1
07161000	1954	24843	38382	00030	2
07161000	1955	31300	35563	00347	3
07161000	1956	27348	34969	02463	4
07161000	1957	35378	33945	-0347	5
07161000	1958	29777	37709	-1226	6
07161000	1959	28420	37396	-0383	7
07161000	1960	34314	35391	-0683	8
07161000	1961	31614	35843	-0079	9
07161000	1962	31271	36021	-0123	10
07161000	1963	29680	36964	-0443	11
07161000	1965	32380	34200	01265	12
07161000	1966	25694	39694	-1615	13
07161000	1967	27110	37007	00519	14
07161000	1969	30253	36990	-0694	15
07161000	1970	25966	38482	-0509	16
07161000	1971	25105	37324	00986	17
07164400	1947	39068	33747	-0783	1
07164400	1950	39692	33181	-0399	2
07164400	1951	41937	32625	-0501	3
07164400	1952	37359	34683	-1218	4
07164400	1953	32605	35988	-1129	5
07164400	1954	31072	36749	-1440	6
07164400	1955	35088	35250	-1119	7
07164400	1956	32790	34150	00655	8
07164400	1957	41599	32304	-0082	9
07164400	1958	38899	33927	-0913	10
07164400	1959	35546	33444	00553	11

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
07164400	1960	41461	32900	-0637	12
07164400	1961	40212	32810	-0181	13
07164400	1962	39827	32330	-0412	14
07164400	1963	35955	33945	-0067	15
07164400	1964	33909	33674	00803	16
07164400	1965	39263	31875	01032	17
07164400	1966	34166	34472	-0070	18
07164400	1967	35428	33464	00568	19
07164400	1968	36580	32923	00771	20
07164400	1969	39552	32041	00781	21
07164400	1970	39112	31875	01077	22
07164400	1971	34232	32504	01878	23
07178600	1948	37077	25524	00895	1
07178600	1949	37566	26085	-0048	2
07178600	1950	36269	26335	-0079	3
07178600	1951	38124	25866	00077	4
07178600	1952	35611	27364	-0997	5
07178600	1953	29053	27875	-0400	6
07178600	1954	29420	26474	00939	7
07178600	1955	30821	27067	00109	8
07178600	1956	24728	27993	00212	9
07178600	1957	38636	24955	00901	10
07178600	1958	35907	26990	-0673	11
07178600	1959	35017	26454	00013	12
07178600	1960	38299	26618	-0705	13
07178600	1961	39727	25198	00474	14
07178600	1962	37451	26884	-0828	15
07178600	1963	31004	28299	-1154	16
07178600	1964	29320	27126	00303	17
07178600	1965	31658	26284	00751	18
07178600	1966	28965	28021	-0531	19
07178600	1967	33054	26335	00464	20
07178600	1968	35740	26702	-0357	21
07178600	1969	38451	25877	00010	22
07178600	1970	36937	25490	00653	23
07193500	1952	38744	24857	-0317	1
07193500	1953	32851	25490	-0133	2
07193500	1954	30637	25527	00137	3
07193500	1955	34609	25289	-0176	4
07193500	1956	31895	25119	00370	5
07193500	1957	40607	23598	00684	6
07193500	1958	39351	24200	00256	7
07193500	1959	36313	24886	-0009	8
07193500	1960	40128	24249	00099	9
07193500	1961	41239	24249	-0054	10
07193500	1962	39350	24698	-0242	11
07193500	1963	35740	24983	-0027	12
07193500	1964	33655	25740	-0495	13
07193500	1965	37292	24609	00132	14
07193500	1966	35599	24518	00458	15
07193500	1967	37168	25038	-0279	16
07193500	1968	40170	24440	-0098	17
07193500	1969	40569	24533	-0246	18
07193500	1970	38463	24609	-0030	19

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
07245000	1947	39542	30043	-0540	1
07245000	1948	38062	30969	-1267	2
07245000	1949	39023	31335	-1762	3
07245000	1950	39984	31038	-1594	4
07245000	1951	36623	32878	-2983	5
07245000	1953	35138	32480	-2385	6
07245000	1954	34730	33997	-3847	7
07245000	1955	34151	33874	-3647	8
07245000	1956	29912	35159	-4363	9
07245000	1957	40630	28274	01084	10
07245000	1958	27914	29440	00282	11
07245000	1959	36209	28407	01544	12
07245000	1960	40128	28149	01275	13
07245000	1961	36435	28710	01211	14
07245000	1962	36713	28414	01470	15
07245000	1963	32929	28825	01566	16
07245000	1964	19868	30453	01692	17
07245000	1967	30645	27910	02788	18
07245000	1968	38189	26355	03330	19
07245000	1969	38228	26758	02922	20
07245000	1970	35502	26812	03233	21
07263500	1946	46923	27889	-0294	1
07263500	1947	46775	28609	-0984	2
07263500	1948	46504	28182	-0500	3
07263500	1949	47666	28645	-1206	4
07263500	1950	47689	27917	-0483	5
07263500	1951	47201	28561	-1025	6
07263500	1952	45880	28319	-0507	7
07263500	1953	43969	27709	00503	8
07263500	1954	40959	30719	-1879	9
07263500	1955	42822	29666	-1215	10
07263500	1956	40065	29552	-0525	11
07263500	1957	48604	26884	00359	12
07263500	1958	46950	27536	00053	13
07263500	1959	44609	27574	00504	14
07263500	1960	47951	27574	-0194	15
07263500	1961	47318	27050	00462	16
07263500	1962	46180	27959	-0209	17
07263500	1963	42553	28627	00120	18
07263500	1964	41113	28062	00746	19
07263500	1965	44631	27657	00416	20
07263500	1966	42889	27604	00833	21
07263500	1967	42380	28287	00256	22
07263500	1968	46474	25717	01971	23
07263500	1969	47917	27185	00202	24
07263500	1970	45340	27774	00151	25
07263500	1971	44298	25539	02604	26
07331000	1945	35465	26693	00726	1
07331000	1947	37522	27284	-0233	2
07331000	1951	32824	28407	-0514	3
07331000	1952	27987	28669	00093	4
07331000	1953	27143	27745	01168	5

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
07331000	1954	30997	27364	00858	6
07331000	1955	29435	27497	01005	7
07331000	1956	26435	29445	-0404	8
07331000	1957	25508	26675	00737	9
07331000	1958	29703	28960	-0506	10
07331000	1959	28062	28910	-0161	11
07331000	1960	32014	29106	-1067	12
07331000	1961	30569	29085	-0787	13
07331000	1962	31303	29243	-1076	14
07331000	1963	27987	29722	-0960	15
07331000	1964	25315	28904	00337	16
07331000	1965	29128	28686	-0129	17
07331000	1966	26998	29872	-0933	18
07331000	1967	26325	28319	00741	19
07331000	1968	30645	27202	01083	20
07331000	1969	31847	28261	-0192	21
07331000	1970	28209	28549	00173	22
07331600	1945	38610	30294	01077	1
07331600	1946	37924	29415	02082	2
07331600	1947	38989	31271	00029	3
07331600	1948	35475	31173	00777	4
07331600	1949	35888	31818	00055	5
07331600	1950	38481	31644	-0249	6
07331600	1951	38446	31761	-0360	7
07331600	1952	33619	31399	00893	8
07331600	1953	32679	31959	00507	9
07331600	1954	35966	31847	00012	10
07331600	1955	34412	31959	00187	11
07331600	1956	35502	32355	-0411	12
07331600	1957	40370	31367	-0322	13
07331600	1958	36355	31461	00326	14
07331600	1959	33614	32742	-0449	15
07331600	1960	37163	32330	-0692	16
07331600	1961	36334	33222	-1431	17
07331600	1962	36558	32967	-1217	18
07331600	1963	34813	32227	-0156	19
07331600	1964	31790	33096	-0467	20
07331600	1965	32885	32672	-0244	21
07331600	1966	34492	32967	-0836	22
07331600	1967	33690	32833	-0554	23
07331600	1968	36153	31931	-0107	24
07331600	1969	37259	31614	00006	25
07331600	1970	34133	31761	00436	26
07331600	1971	32529	31492	01001	27
07344400	1958	44914	26693	00131	1
07344400	1959	39566	28215	-0406	2
07344400	1960	43324	28041	-0925	3
07344400	1961	43096	28954	-1795	4
07344400	1962	42967	27910	-0727	5
07344400	1963	40682	27987	-0383	6
07344400	1964	39053	27372	00532	7
07344400	1965	41335	26522	00961	8
07344400	1966	41584	27634	-0197	9
07344400	1967	41593	27202	00234	10

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
07344400	1968	45378	25185	01553	11
07344400	1969	37604	29355	-1184	12
07344400	1970	41038	26821	00717	13
07344400	1971	38344	26599	01436	14
07344400	1972	38987	27839	00077	15
07367000	1962	43424	22355	-0453	01
07367000	1963	38122	26345	-1148	02
07367000	1964	39912	23222	00863	03
07367000	1965	40043	23945	00059	04
07367000	1966	40645	22718	00911	05
07367000	1968	44579	21430	-0245	06
08030500	1948	39134	22810	-0856	1
08030500	1949	39363	21673	00257	2
08030500	1950	42025	20682	00968	3
08030500	1951	36409	23345	-1104	4
08030500	1952	38072	22504	-0438	5
08030500	1953	40913	20755	01012	6
08030500	1954	36125	23054	-0783	7
08030500	1955	37462	22405	-0275	8
08030500	1956	35342	22455	-0102	9
08030500	1957	39843	21790	00090	10
08030500	1958	40896	21644	00125	11
08030500	1959	38276	22833	-0788	12
08030500	1960	38159	23054	-0997	13
08030500	1961	40933	21534	00181	14
08030500	1962	38751	22430	-0436	15
08030500	1963	34519	23711	-1271	16
08030500	1964	35119	21987	00390	17
08030500	1965	36108	23263	-0991	18
08030500	1966	38781	21847	00144	19
08030500	1967	32920	21584	01024	20
08030500	1968	36590	20864	01358	21
08030500	1969	40899	21875	-0107	22
08030500	1970	34409	21399	01053	23
08030500	1971	35211	20864	01503	24
08041000	1948	36814	22529	-0688	1
08041000	1949	37016	21584	00207	2
08041000	1950	40558	20607	00294	3
08041000	1951	33101	23464	-0690	4
08041000	1952	35703	22405	-0285	5
08041000	1953	39126	20374	00886	6
08041000	1954	33251	22878	-0142	7
08041000	1955	34982	22279	00022	8
08041000	1956	32063	22967	00068	9
08041000	1957	36634	21038	00848	10
08041000	1958	39276	21271	-0048	11
08041000	1959	37128	21790	-0028	12
08041000	1960	36747	22553	-0695	13
08041000	1961	40175	21004	-0007	14
08041000	1962	37138	22330	-0570	15
08041000	1963	33330	23118	-0402	16
08041000	1964	34155	22304	00204	17
08041000	1965	32198	23201	-0201	18

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
08041000	1966	35256	21523	00710	19
08041000	1967	32074	22695	00336	20
08041000	1968	37098	21818	-0049	21
08041000	1969	39722	21523	-0412	22
08041000	1970	33729	22529	00087	23
08041000	1971	30531	22900	00519	24
08065350	1964	30792	28927	-0484	01
08065350	1965	38182	25977	00055	02
08065350	1966	38222	25843	00176	03
08065350	1967	31461	28432	-0208	04
08065350	1968	39713	25752	-0219	05
08065350	1969	38876	25809	-0004	06
08065350	1970	37067	26385	00011	07
08065350	1971	31303	27604	00671	08
08068000	1962	22279	25694	-1362	01
08068000	1963	23962	24082	-0008	02
08068000	1964	23874	24200	-0112	03
08068000	1965	26042	23139	00618	04
08068000	1966	26335	23483	00229	05
08068000	1967	28842	24346	-1016	06
08068000	1968	28351	22742	00663	07
08068000	1969	28344	23010	00395	08
08068000	1970	20755	24472	00092	09
08068000	1971	16902	24654	00498	10
08082500	1960	24456	35977	00463	1
08082500	1961	29069	35502	-0137	2
08082500	1962	24886	36355	-0015	3
08082500	1963	24757	36425	-0054	4
08082500	1964	19430	37135	00476	5
08082500	1965	22945	35658	01134	6
08082500	1966	26902	36263	-0393	7
08082500	1967	25441	36314	-0104	8
08082500	1968	23636	38476	-1844	9
08082500	1969	24440	35888	00556	10
08082500	1970	22480	38692	-1792	11
08082500	1971	24928	34624	01706	12
08123800	1959	12014	30531	02276	1
08123800	1960	15276	29741	01098	2
08123800	1961	17709	29074	00297	3
08123800	1962	16981	29777	00033	4
08123800	1963	10934	32553	00905	5
08123800	1964	10000	31931	02090	6
08123800	1965	16998	28865	00935	7
08123800	1966	16474	31523	-1407	8
08123800	1967	13010	32742	-0536	9
08123800	1968	12304	35832	-3201	10
08123800	1969	13802	33118	-1390	11
08123800	1970	17160	36830	-1096	12

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
08126500	1962	22695	29504	00227	01
08126500	1963	18215	33118	-1954	02
08126500	1964	18639	29717	01310	03
08126500	1965	23160	29165	00418	04
08126500	1966	23222	30334	-0772	05
08126500	1967	19542	30645	00094	06
08126500	1968	12041	33243	-0105	07
08126500	1969	17160	30607	00894	08
08126500	1970	14771	32380	-0116	09
08158000	1948	31202	27210	-0402	1
08158000	1949	30842	26875	-0016	2
08158000	1950	31014	26605	00170	3
08158000	1951	30237	26965	-0017	4
08158000	1952	28774	27177	-0022	5
08158000	1953	29643	25843	01188	6
08158000	1954	29754	26107	00908	7
08158000	1955	31212	26345	00462	8
08158000	1956	31242	26191	00612	9
08158000	1957	36902	25428	00566	10
08158000	1958	36388	25670	00397	11
08158000	1959	32125	26314	00362	12
08158000	1960	35465	26294	-0095	13
08158000	1961	33983	26758	-0347	14
08158000	1962	31504	27126	-0362	15
08158000	1963	30237	27803	-0857	16
08158000	1964	28627	28007	-0831	17
08158000	1965	31688	27101	-0362	18
08158000	1966	32154	26785	-0113	19
08158000	1967	30116	26721	00242	20
08158000	1968	35390	26656	-0446	21
08158000	1969	30682	26884	-0002	22
08158000	1970	34518	27007	-0672	23
08158000	1971	29800	27466	-0458	24
08162000	1945	35759	26159	-0125	1
08162000	1946	35484	26304	-0234	2
08162000	1947	34900	26571	-0423	3
08162000	1948	30955	27243	-0574	4
08162000	1949	32562	26085	00371	5
08162000	1950	33092	26042	00344	6
08162000	1951	29504	27101	-0240	7
08162000	1952	28831	26758	00192	8
08162000	1953	31287	25478	01147	9
08162000	1954	29445	26085	00783	10
08162000	1955	30777	26345	00348	11
08162000	1956	30175	26385	00387	12
08162000	1957	37736	25198	00575	13
08162000	1958	37873	25490	00265	14
08162000	1959	33751	25944	00356	15
08162000	1960	36605	25980	-0066	16
08162000	1961	37316	25705	00123	17
08162000	1962	32345	27084	-0599	18
08162000	1963	29987	27505	-0708	19

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
08162000	1964	27889	27664	-0590	20
08162000	1965	33762	26405	-0107	21
08162000	1966	33644	26435	-0121	22
08162000	1967	29420	26730	00142	23
08162000	1968	37115	26117	-0262	24
08162000	1969	33222	26243	00127	25
08162000	1970	35611	26821	-0768	26
08162000	1971	30253	27110	-0348	27
08164500	1960	29112	23284	-0149	1
08164500	1961	31784	22553	-0264	2
08164500	1962	24472	25328	-0724	3
08164500	1963	20864	25944	-0199	4
08164500	1964	22430	25289	-0040	5
08164500	1965	26513	23802	00155	6
08164500	1966	28021	23820	-0341	7
08164500	1967	25729	22625	01581	8
08164500	1968	30183	22355	00440	9
08164500	1969	28579	23747	-0445	10
08164500	1970	27459	23617	00040	11
08164500	1971	25599	24298	-0051	12
08176500	1946	32608	29450	-2603	1
08176500	1949	30792	28007	-0982	2
08176500	1950	30257	28519	-1441	3
08176500	1951	27340	28116	-0751	4
08176500	1952	29133	26964	00225	5
08176500	1953	30310	27308	-0235	6
08176500	1954	27388	27126	00234	7
08176500	1955	25729	27050	00474	8
08176500	1956	21206	28055	-0086	9
08176500	1957	32951	25682	01131	10
08176500	1958	35491	26444	00118	11
08176500	1959	31987	27084	-0176	12
08176500	1960	32465	26821	00039	13
08176500	1961	35871	26314	00211	14
08176500	1962	29609	27300	-0158	15
08176500	1963	27520	27308	00040	16
08176500	1964	27543	26803	00542	17
08176500	1965	32582	26212	00637	18
08176500	1966	31906	26739	00176	19
08176500	1967	30881	25276	01740	20
08176500	1968	34686	26355	00287	21
08176500	1969	32601	26821	00026	22
08176500	1970	32529	26866	-0012	23
08176500	1971	29345	26618	00550	24
08188500	1959	27760	28645	-0529	1
08188500	1960	26325	28722	-0101	2
08188500	1961	29978	27513	-0176	3
08188500	1962	25729	29117	-0287	4
08188500	1963	22923	29360	00456	5
08188500	1964	24609	28645	00578	6
08188500	1965	28299	27649	00277	7
08188500	1966	25911	28859	-0093	8
08188500	1967	30663	25011	02085	9

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
08188500	1968	30573	28274	-1146	10
08188500	1969	27308	28831	-0556	11
08188500	1970	27050	28915	-0550	12
08188500	1971	25490	28882	00032	13
08189500	1962	16222	38494	-2142	01 * using 7070 µmhos/cm for Ksc
08189500	1963	10253	41239	-0412	02
08189500	1964	11430	40531	-0586	03
08189500	1965	16599	35416	00654	04
08189500	1966	21004	33118	-0349	05
08189500	1967	28109	28407	-0965	06
08189500	1968	22227	32833	-0982	07
08189500	1969	19138	33222	00945	08
08189500	1970	19031	30414	03833	09
08211000	1948	21703	27435	00093	1
08211000	1949	30881	25635	00007	2
08211000	1950	25315	26551	00234	3
08211000	1951	27657	25670	00634	4
08211000	1952	23874	26920	00162	5
08211000	1953	28698	25658	00432	6
08211000	1954	26675	26405	00101	7
08211000	1955	21303	27474	00136	8
08211000	1956	22648	26812	00522	9
08211000	1957	32927	25224	-0004	10
08211000	1958	31870	25798	-0360	11
08211000	1959	29185	26425	-0435	12
08211000	1960	27796	26712	-0436	13
08211000	1961	29279	26415	-0444	14
08211000	1962	20453	27657	00129	15
08211000	1963	20374	28176	-0374	16
08211000	1964	20170	27912	-0074	17
08211000	1965	28960	26075	-0038	18
08211000	1966	26551	26464	00068	19
08211000	1967	33359	23502	01630	20
08211000	1968	30906	25977	-0341	21
08211000	1969	21303	27657	-0046	22
08211000	1970	28567	27404	-1286	23
08211000	1971	33304	25441	-0297	24
08313000	1947	30043	25416	00025	1
08313000	1948	32732	24669	00382	2
08313000	1949	32553	24955	00122	3
08313000	1950	29619	25490	00012	4
08313000	1951	27372	25786	00041	5
08313000	1952	32783	24698	00345	6
08313000	1953	28797	25647	-0026	7
08313000	1954	27938	25670	00075	8
08313000	1955	27760	25933	-0162	9
08313000	1956	27152	25635	00225	10
08313000	1957	32529	25065	00016	11
08313000	1958	33243	25403	-0426	12
08313000	1959	28476	25623	00045	13
08313000	1960	30535	25092	00277	14
08313000	1961	29699	25453	00037	15
08313000	1962	31572	25105	00114	16

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
08313000	1963	28887	25289	00319	17
08313000	1964	27226	25705	00143	18
08313000	1965	32114	25038	00103	19
08313000	1966	31139	25575	-0293	20
08313000	1967	29042	26375	-0789	21
08313000	1968	30719	25453	-0110	22
08313000	1969	31644	25514	-0306	23
08313000	1970	31004	25416	-0114	24
08313000	1971	29222	25478	00082	25
08313000	1972	28651	25809	-0167	26
08358300	1954	23096	31072	-1176	1
08358300	1955	24802	30755	-1142	2
08358300	1956	24031	29934	-0307	3
08358300	1957	26646	28825	00053	4
08358300	1958	18007	30253	01102	5
08358300	1959	23522	30374	-0601	6
08358300	1960	26128	28768	00259	7
08358300	1961	26263	28745	00243	8
08358300	1962	28681	27938	00357	9
08358300	1963	27664	28021	00565	10
08358300	1964	23729	29243	00471	11
08358300	1965	28621	27931	00381	12
08358300	1966	29983	27796	00125	13
08358300	1967	26656	29533	-0658	14
08358300	1968	28222	28176	00251	15
08358300	1969	29763	28082	-0093	16
08358300	1970	30899	28041	-0383	17
08358300	1971	27474	28062	00579	18
08358300	1972	26964	28808	-0021	19
08407500	1938	22601	38248	-0298	1
08407500	1939	21703	38537	-0157	2
08407500	1940	21303	38657	-0085	3
08407500	1941	32188	34314	-0958	4
08407500	1942	30414	36263	-2058	5
08407500	1943	25145	37126	-0396	6
08407500	1944	22253	38096	00021	7
08407500	1945	21553	38287	00165	8
08407500	1946	20170	38785	00329	9
08407500	1947	21367	38248	00293	10
08407500	1948	21072	37528	01154	11
08407500	1949	21931	37846	00425	12
08407500	1950	23385	37574	00000	13
08407500	1951	21644	38331	00077	14
08407500	1952	17520	40000	00384	15
08407500	1953	16191	40899	00122	16
08407500	1954	17474	39566	00840	17
08407500	1955	24654	35866	01100	18
08407500	1956	19430	39818	-0349	19
08407500	1957	16702	40569	00207	20
08407500	1958	21461	38000	00496	21
08407500	1959	20453	39058	-0079	22
08407500	1960	20607	38831	00074	23
08407500	1961	20170	39745	-0631	24
08407500	1962	17042	41139	-0526	25

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
08407500	1963	16972	41173	-0526	26
08407500	1964	14249	41106	00846	27
08407500	1965	17332	40682	-0207	28
08407500	1966	25999	33424	02897	29
08407500	1967	15955	42475	-1340	30
08407500	1968	15441	41931	-0550	31
08407500	1969	15051	41903	-0336	32
08407500	1971	15051	41303	00264	33
08407500	1972	13979	43284	-1202	34
09152500	1938	35301	28876	-0354	1
09152500	1939	32874	30128	-0346	2
09152500	1940	31614	30969	-0533	3
09152500	1941	35011	29405	-0732	4
09152500	1942	36021	28651	-0502	5
09152500	1943	33860	29499	-0229	6
09152500	1944	35490	28122	00302	7
09152500	1945	34200	29206	-0113	8
09152500	1946	33181	29877	-0254	9
09152500	1947	34072	29274	-0114	10
09152500	1948	35274	29004	-0467	11
09152500	1949	34664	28943	-0090	12
09152500	1950	32824	28615	01194	13
09152500	1951	31392	30492	00058	14
09152500	1952	35443	28293	00155	15
09152500	1953	32567	30086	-0145	16
09152500	1954	29605	31847	-0369	17
09152500	1955	31541	30253	00220	18
09152500	1956	31855	29713	00598	19
09152500	1957	36466	27796	00122	20
09152500	1958	35175	28531	00057	21
09152500	1959	31183	30792	-0132	22
09152500	1960	32822	29385	00424	23
09152500	1961	31471	30374	00136	24
09152500	1962	34816	28209	00565	25
09152500	1963	31011	30792	-0043	26
09152500	1964	32686	29614	00265	27
09152500	1965	35570	28136	00247	28
09152500	1966	31596	30607	-0162	29
09152500	1967	30881	31038	-0222	30
09152500	1968	32989	29727	-0004	31
09152500	1969	34133	29274	-0145	32
09152500	1970	35250	28182	00366	33
09152500	1971	35145	28457	00146	34
09152500	1972	31673	30212	00193	35
09180500	1936	37689	30128	-0084	1
09180500	1939	39096	29025	00170	2
09180500	1947	39921	29143	-0023	3
09180500	1948	39556	29154	-0236	4
09180500	1949	39388	29112	-0092	5
09180500	1950	37786	30128	-0142	6
09180500	1951	37120	30170	00217	7
09180500	1952	40561	28325	-0014	8
09180500	1953	36730	30792	-0169	9
09180500	1954	35181	31732	-0175	10

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
09180500	1955	37107	30253	00142	11
09180500	1956	37954	29643	00242	12
09180500	1957	40689	28319	-0084	13
09180500	1958	39433	29340	-0348	14
09180500	1959	36331	30969	-0105	15
09180500	1960	37553	29786	00340	16
09180500	1961	36294	30864	00022	17
09180500	1962	39661	28704	00151	18
09180500	1963	35905	31367	-0247	19
09180500	1964	36650	30453	00218	20
09180500	1965	39467	28982	-0010	21
09180500	1966	36852	30645	-0095	22
09180500	1967	36207	30172	-0133	23
09180500	1968	37686	29791	00255	24
09180500	1969	38178	29657	00093	25
09180500	1972	37067	30374	00045	26
09234500	1957	34276	27356	00935	1
09234500	1958	33856	27427	00904	2
09234500	1959	31951	27782	00733	3
09234500	1960	31181	28129	00392	4
09234500	1961	30137	28035	00655	5
09234500	1962	34652	27709	00546	6
09234500	1963	23636	29759	-0444	7
09234500	1964	30622	28312	00330	8
09234500	1965	33477	28831	-0463	9
09234500	1966	32127	28960	-0462	10
09234500	1967	33349	29263	-0883	11
09234500	1968	34031	29128	-0813	12
09234500	1969	34298	28921	-0632	13
09234500	1970	34014	28488	-0172	14
09234500	1972	34800	28882	-0641	15
09251000	1951	32101	23010	00946	1
09251000	1952	33038	23404	00439	2
09251000	1953	30588	23747	00391	3
09251000	1954	28579	24362	00018	4
09251000	1955	30282	23747	00427	5
09251000	1956	31553	23541	00481	6
09251000	1957	33909	23692	00046	7
09251000	1958	32435	24232	-0317	8
09251000	1959	30508	23784	00364	9
09251000	1960	31436	23747	00289	10
09251000	1961	29390	24166	00116	11
09251000	1962	33139	24548	-0717	12
09251000	1963	29395	24440	-0159	13
09251000	1964	30763	23655	00462	14
09251000	1965	32586	23054	00844	15
09251000	1966	29872	25832	-1608	16
09251000	1967	30980	23838	00253	17
09251000	1968	31987	24829	-0859	18
09251000	1969	31818	23856	00134	19
09251000	1970	33032	24298	-0454	20
09251000	1971	33181	24442	-0645	21
09251000	1972	30682	24713	-0586	22

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
09306500	1951	28463	27973	00498	1
09306500	1952	29983	28445	-0464	2
09306500	1953	27917	29025	-0398	3
09306500	1954	26721	29805	-0772	4
09306500	1955	27292	28943	-0094	5
09306500	1956	27612	28645	00100	6
09306500	1957	30013	28395	-0423	7
09306500	1958	29090	28686	-0418	8
09306500	1959	27589	28567	00186	9
09306500	1960	27419	28407	00400	10
09306500	1961	26776	28837	00178	11
09306500	1962	29647	28470	-0380	12
09306500	1963	26684	29180	-0135	13
09306500	1964	27372	28579	00244	14
09306500	1965	28932	28494	-0174	15
09306500	1966	27024	29238	-0303	16
09306500	1967	27267	28808	00049	17
09306500	1968	28162	28531	00037	18
09306500	1969	28228	27945	00602	19
09306500	1970	29605	28254	-0151	20
09306500	1972	29494	26712	01427	21
09315000	1936	37569	27796	00540	1
09315000	1939	36743	28779	-0310	2
09315000	1947	38793	27896	00242	3
09315000	1948	37569	28195	00140	4
09315000	1949	38302	28149	00068	5
09315000	1950	38815	28299	-0166	6
09315000	1951	37744	28209	00099	7
09315000	1952	39744	28407	-0424	8
09315000	1953	36711	28692	-0218	9
09315000	1954	35669	28745	-0101	10
09315000	1955	35965	28488	00107	11
09315000	1956	37473	27657	00695	12
09315000	1957	38839	27497	00633	13
09315000	1958	37902	28162	00119	14
09315000	1959	35805	28457	00164	15
09315000	1960	36189	28082	00477	16
09315000	1961	34470	28537	00301	17
09315000	1962	39059	27853	00241	18
09315000	1963	33612	29445	-0468	19
09315000	1964	35858	28388	00224	20
09315000	1965	38507	28482	-0298	21
09315000	1966	36470	29063	-0550	22
09315000	1967	37423	28982	-0622	23
09315000	1968	38082	28820	-0567	24
09315000	1969	38323	28727	-0514	25
09368000	1942	35860	26435	-0799	1
09368000	1943	32608	26902	00277	2
09368000	1944	34635	25539	00678	3
09368000	1945	33054	26425	00543	4
09368000	1958	35186	26031	-0076	5
09368000	1959	39350	28513	00213	6
09368000	1960	33688	26609	00057	7
09368000	1961	32133	27582	-0177	8

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
09368000	1962	32991	26522	00475	9
09368000	1963	38463	29390	-0244	10
09368000	1964	29809	28751	-0243	11
09368000	1965	34265	26767	-0375	12
09368000	1966	33835	26749	-0152	13
09368000	1967	30488	28859	-0674	14
09368000	1968	30864	27931	00076	15
09368000	1969	33181	27007	-0100	16
09368000	1970	32355	27084	00215	17
09368000	1972	31173	27543	00317	18
09379500	1937	35088	27868	-0264	1
09379500	1938	35324	27619	-0097	2
09379500	1939	32335	28149	00401	3
09379500	1940	31374	28768	00113	4
09379500	1941	37678	27803	-1091	5
09379500	1942	36288	27760	-0570	6
09379500	1943	33002	28439	-0118	7
09379500	1944	35058	27193	00420	8
09379500	1945	33497	28116	00035	9
09379500	1946	30770	29090	-0001	10
09379500	1947	33130	28439	-0162	11
09379500	1948	35043	27016	00603	12
09379500	1949	35422	27210	00278	13
09379500	1950	30955	28633	00392	14
09379500	1951	29484	29074	00457	15
09379500	1952	36296	26628	00560	16
09379500	1953	31159	28686	00268	17
09379500	1954	31392	29191	-0316	18
09379500	1955	31446	28733	00123	19
09379500	1956	30745	28287	00811	20
09379500	1957	35547	27202	00243	21
09379500	1958	35469	27332	00140	22
09379500	1959	29315	29499	00091	23
09379500	1960	33672	27466	00624	24
09379500	1961	32151	28567	00046	25
09379500	1962	33195	27723	00531	26
09379500	1963	29365	30719	-1146	27
09379500	1964	30378	29818	-0594	28
09379500	1965	34473	27987	-0172	29
09379500	1966	34347	27993	-0135	30
09379500	1967	31069	29886	-0899	31
09379500	1968	31461	29232	-0381	32
09379500	1969	33585	28261	-0140	33
09379500	1970	34473	27987	-0172	34
09379500	1972	30682	28960	00160	35
09380000	1943	42167	28904	00203	1
09380000	1944	42596	28325	00633	2
09380000	1947	42781	29455	-0561	3
09380000	1948	42749	28716	00189	4
09380000	1949	42969	28831	-0003	5
09380000	1950	41833	29294	-0071	6
09380000	1951	41323	29430	-0029	7
09380000	1952	43934	28537	-0045	8
09380000	1953	40842	29731	-0163	9

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
09380000	1954	39257	30607	-0487	10
09380000	1955	40032	30128	-0278	11
09380000	1956	40806	29274	00307	12
09380000	1957	43789	28585	-0043	13
09380000	1958	42931	29149	-0307	14
09380000	1959	39690	30128	-0159	15
09380000	1960	41021	29284	00222	16
09380000	1961	39627	30294	-0303	17
09380000	1962	43097	28692	00091	18
09380000	1963	35382	31614	-0146	19
09380000	1964	35210	31139	00388	20
09380000	1965	41744	28663	00592	21
09380000	1966	40565	28831	00834	22
09380000	1967	40322	29652	00097	23
09380000	1968	40645	30086	-0449	24
09380000	1969	40864	29791	-0230	25
09380000	1970	40755	29708	-0110	26
09380000	1972	42148	29385	-0272	27
09412500	1940	40253	30569	-0118	1
09412500	1941	42095	30569	-0367	2
09412500	1942	43972	30334	-0385	3
09412500	1943	42370	30043	00122	4
09412500	1944	42991	30128	-0047	5
09412500	1951	41886	29899	00331	6
09412500	1952	43345	29886	00148	7
09412500	1953	42799	29722	00305	8
09412500	1954	41691	30043	00214	9
09412500	1955	41075	30607	-0267	10
09412500	1956	40322	30899	-0458	11
09412500	1957	40481	30682	-0262	12
09412500	1958	42289	29934	00242	13
09412500	1959	41297	29750	00560	14
09412500	1960	40152	29926	00417	15
09412500	1961	40777	30170	00210	16
09412500	1962	40596	30374	00030	17
09412500	1968	40334	30374	00065	18
09412500	1969	40414	30569	-0140	19
09412500	1970	49657	30607	-0076	20
09412500	1971	42405	30645	-0484	21
09412500	1972	42405	30531	-0370	22
09502000	1951	27868	32810	-1967	1
09502000	1952	25587	30374	01043	2
09502000	1953	29845	28579	01765	3
09502000	1954	28445	29795	00902	4
09502000	1955	29309	30138	-0558	5
09502000	1956	29777	31875	-1513	6
09502000	1957	27789	32122	-1259	7
09502000	1958	27882	31584	-0744	8
09502000	1959	28859	30453	00140	9
09502000	1960	27435	29836	01116	10
09502000	1961	28932	30043	00532	11
09502000	1962	28603	30899	-0241	12
09502000	1963	30445	30607	-0414	13
09502000	1964	28591	31004	-0343	14

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
09502000	1965	26325	31399	-0167	15
09502000	1966	30496	29106	01074	16
09502000	1967	29243	29435	01061	17
09502000	1968	32041	29671	00120	18
09502000	1969	29956	29741	00576	19
09502000	1970	30492	30170	00011	20
09502000	1972	30374	31430	-1219	21
09510000	1951	24393	27101	00237	01
09510000	1952	29206	25453	00076	02
09510000	1953	25065	27634	-0548	03
09510000	1954	26107	26599	00095	04
09510000	1955	23324	27832	-0092	05
09510000	1956	24377	27882	-0537	06
09510000	1957	25911	25899	00869	07
09510000	1958	27657	25944	00168	08
09510000	1959	25328	27396	-0409	09
09510000	1960	28102	25877	00067	10
09510000	1961	22648	28007	-0013	11
09510000	1962	27050	26274	00066	12
09510000	1963	23222	27760	00019	13
09510000	1964	25752	27210	-0382	14
09510000	1965	29355	25250	00223	15
09510000	1966	28169	25670	00249	16
09510000	1967	27101	26675	-0354	17
09510000	1968	28363	26064	-0218	18
09510000	1969	27649	26075	00040	19
09510000	1970	22279	27340	00793	20
09510000	1972	25119	27388	-0322	21
11152500	1952	23838	27803	-0705	1
11152500	1953	25647	26964	-0161	2
11152500	1954	00792	31271	-0413	3
11152500	1958	28382	25933	00424	4
11152500	1959	23617	26021	01113	5
11152500	1960	15563	27818	00630	6
11152500	1961	01461	31303	-0555	7
11152500	1962	16435	27275	01030	8
11152500	1963	27767	26170	00287	9
11152500	1964	16812	26758	01486	10
11152500	1965	11461	30000	-0883	11
11152500	1966	16128	29122	-0766	12
11152500	1967	23324	28457	-1276	13
11152500	1968	15185	27582	00928	14
11152500	1969	33139	26721	-1140	15
11303500	1951	35224	24997	00628	1
11303500	1952	39958	22227	00615	2
11303500	1953	34170	25809	00435	3
11303500	1954	33749	25809	00682	4
11303500	1955	31294	27731	00205	5
11303500	1956	39388	23222	-0045	6
11303500	1957	32993	27076	-0139	7
11303500	1958	39225	23892	-0619	8
11303500	1959	32350	27597	-0283	9
11303500	1960	28791	29494	-0088	10

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
11303500	1961	27810	29859	00124	11
11303500	1962	33126	27193	-0335	12
11303500	1963	36684	25038	-0271	13
11303500	1964	32095	27993	-0529	14
11303500	1965	37007	24955	-0379	15
11477000	1952	40212	21367	00038	1
11477000	1953	41614	20682	00487	2
11477000	1954	39619	21335	00170	3
11477000	1955	37846	21492	00311	4
11477000	1956	41367	21206	00005	5
11477000	1957	39067	21673	-0075	6
11477000	1958	42792	20792	00179	7
11477000	1959	34023	22742	-0295	8
11477000	1960	41239	22122	-0889	9
11477000	1961	36263	22330	-0260	10
11477000	1962	46294	21271	00793	11
11477000	1963	40073	21271	00157	12
11477000	1964	33284	22380	00190	13
11477000	1965	36776	21903	00080	14
11477000	1966	37118	22175	-0249	15
11477000	1967	37597	22625	-0779	16
11477000	1968	38751	21271	00380	17
11477000	1969	43345	20569	00309	18
11477000	1970	35453	22014	00192	19
11477000	1971	40000	22201	-0760	20
11530500	1952	45051	20645	00081	1
11530500	1953	44886	20682	00074	2
11530500	1954	44216	20531	00346	3
11530500	1955	40531	21173	00369	4
11530500	1956	44150	21139	-0251	5
11530500	1957	42625	20492	00672	6
11530500	1958	44346	20864	-0011	7
11530500	1959	41173	21271	00155	8
11530500	1960	42279	20828	00398	9
11530500	1961	40899	21303	00172	10
11530500	1962	40128	21492	00122	11
11530500	1963	43444	21004	00012	12
11530500	1964	42304	20792	00430	13
11530500	1965	41847	21430	-0126	14
11530500	1966	41553	21875	-0518	15
11530500	1967	42175	21430	-0185	16
11530500	1968	40755	21732	-0231	17
11530500	1969	43528	21335	-0335	18
11530500	1970	41335	22068	-0672	19
11530500	1971	43617	21335	-0351	20

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
12031000	1960	36355	17709	-0217	01
12031000	1962	35428	17482	00249	02
12031000	1963	36075	17404	00160	03
12031000	1964	34216	17634	00408	04
12031000	1966	35786	17559	00080	05
12031000	1967	35159	17853	-0053	06
12031000	1968	34048	18261	-0175	07
12031000	1969	36314	17559	-0056	08
12031000	1970	33674	18513	-0330	09
12031000	1971	37177	17404	-0123	10
12200500	1960	42175	17160	-0108	1
12200500	1961	42742	16990	-0049	2
12200500	1962	42201	16990	00057	3
12200500	1963	42989	16812	00080	4
12200500	1964	43365	16812	00080	5
12200500	1965	41703	17404	-0260	6
12200500	1966	42253	16990	00047	7
12200500	1967	42380	17076	-0064	8
12200500	1968	42742	16902	00039	9
12200500	1969	42253	16902	00134	10
12200500	1970	41206	17076	00165	11
12433000	1960	39465	19912	-0026	1
12433000	1961	39600	19777	00053	2
12433000	1962	38470	20334	-0034	3
12433000	1963	38014	20334	00156	4
12433000	1964	38965	20294	-0199	5
12433000	1965	40294	19685	-0143	6
12433000	1966	37135	21106	-0250	7
12433000	1967	39101	20128	-0090	8
12433000	1968	38156	20294	00137	9
12433000	1969	39576	19912	-0072	10
12433000	1970	38363	20253	00092	11
12433000	1971	40212	19494	00082	12
12510500	1953	35340	23424	00019	1
12510500	1954	36303	22856	00100	2
12510500	1955	34869	23522	00160	3
12510500	1956	38485	22304	-0453	4
12510500	1957	35870	22923	00252	5
12510500	1958	34709	23747	00016	6
12510500	1959	36342	22833	00103	7
12510500	1960	36042	22648	00440	8
12510500	1961	36253	22833	00148	9
12510500	1962	34396	23892	00029	10
12510500	1963	35215	23464	00043	11
12510500	1964	33934	24166	-0011	12
12510500	1965	36243	23139	00152	13
12510500	1966	33408	24683	-0262	14
12510500	1967	34681	23874	-0097	15
12510500	1968	35366	23201	00229	16
12510500	1969	36053	23160	-0077	17
12510500	1970	34533	24314	-0462	18
12510500	1971	36693	22695	00063	19

APPENDIX G.--STATION-RECORD SUMMARIES OF LOGARITHMIC TRANSFORMED STREAM DISCHARGE, SPECIFIC CONDUCTANCE, AND REGRESSION RESIDUALS.

STATION	YEAR	LOG Q	LOG K	RESID	SEQUENCE
13154500	1951	40755	26920	00021	1
13154500	1952	41430	26866	-0017	2
13154500	1953	40141	27202	-0177	3
13154500	1954	39731	27251	-0171	4
13154500	1955	39757	27218	-0143	5
13154500	1956	40719	27042	-0096	6
13154500	1957	40469	27084	-0104	7
13154500	1958	39900	27118	-0061	8
13154500	1959	39373	27202	-0073	9
13154500	1960	39926	27160	-0012	10
13154500	1961	38726	27101	00115	11
13154500	1962	39260	27093	00051	12
13154500	1963	39703	27110	-0026	13
13154500	1964	40056	27143	-0107	14
13154500	1965	40970	26981	-0069	15
13154500	1966	40249	27076	-0066	16
13154500	1967	39267	27210	-0067	17
13154500	1968	39754	27226	-0150	18
13154500	1969	40755	26964	-0023	19
13154500	1971	41553	26721	00112	20
13212500	1951	32842	23541	00360	1
13212500	1952	33473	23139	00365	2
13212500	1953	31467	24548	00217	3
13212500	1954	30430	25263	00155	4
13212500	1955	35866	28162	00126	5
13212500	1956	33371	23385	00184	6
13212500	1957	32896	23962	-0095	7
13212500	1958	32492	24314	-0193	8
13212500	1959	27372	27723	-0382	9
13212500	1960	29058	26513	-0232	10
13212500	1961	25786	28195	00143	11
13212500	1962	26263	27903	00136	12
13212500	1963	29269	26042	00106	13
13212500	1964	30004	25866	-0180	14
13212500	1965	34986	22765	-0212	15
13212500	1966	27752	27443	-0341	16
13212500	1967	27634	27126	00050	17
13212500	1968	27007	27543	00027	18
13212500	1969	32480	24065	00063	19
13212500	1970	32945	23766	00071	20
13212500	1971	35551	22529	-0331	21
50071000	1962	15682	20531	-0046	1
50071000	1963	16435	20170	00358	2
50071000	1964	14150	20334	-0046	3
50071000	1965	15682	20492	-0007	4
50071000	1966	15185	20414	00043	5
50071000	1967	15315	20294	00170	6
50071000	1968	14472	20569	-0154	7
50071000	1969	16335	20569	-0046	8
50071000	1970	16812	21038	-0488	9
50071000	1971	15051	20607	-0158	10
50071000	1972	16435	20253	00275	11

Appendix G.--Explanation of notation and implied decimals

Station - USGS station number

Year - Water year

LOG Q - Logarithm base 10 of annual mean discharge. Implied decimal is four places to left of last figure.

LOG K - Logarithm base 10 of annual mean specific conductance. Implied decimal is four places to left of last figure.

RESID - The difference between the annual mean specific conductance (LOG K) and the computed annual mean specific conductance obtained from the logarithmic regression relation of specific conductance on discharge. Residuals are expressed in logarithms base 10 of specific conductance units (micromhos per centimeter at 25°C). Implied decimal is four places to the left of last figure.

Sequence - Provides order to the annual water year data at each station.

Appendix H.--Outline and brief description of stepwise procedures and description of computer programs used in the assessment

The purpose of this appendix is to describe in outline form the analytical procedures utilized in the assessment. For purposes of this discussion, the procedures followed for three distinct components of the study (p. 11) are described separately. Several optional steps in the computer-program sequential flow-charts are indicated. In several cases, results of the computer program analysis have not been incorporated into this study report but rather will be tabulated in one or more later reports.

Computer-program documentation reports are referenced when available. The various summary products for the assessment are indicated by referring to tables or appendices of this report.

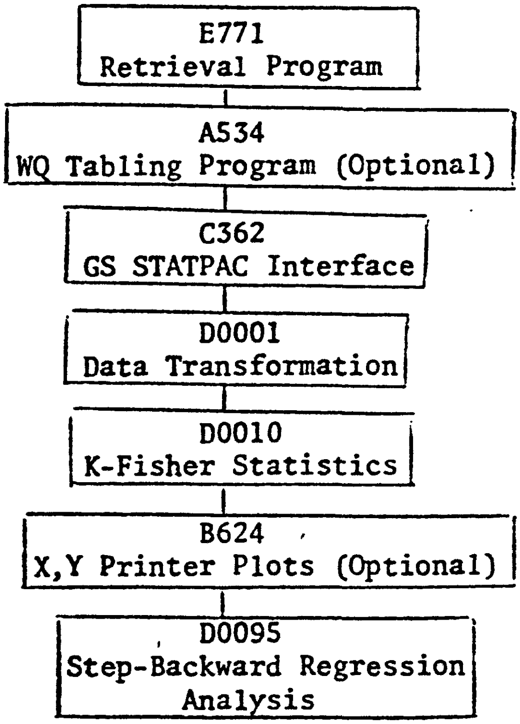
Component 1: Areal (nationwide) variations in streamflow chemical quality

Stepwise procedure of the analysis: Computer Program Number:

1. Select stations for inclusion in the assessment (based upon criteria for component 3).

2. Specify period of record (1966-1972) and parameter codes; retrieve data sets from WRD Water Quality File and store on work-file desk.

3. Process data records for each station through a sequence of data-analysis programs; include editing procedures.



4. Summarize results:

   a. See appendix D for D0010 summary for selected variables

   b. D0095 results are not included in this report

Notes: Computer programs E771, A534, and C362 are documented in the operating manual for the WRD National Water Data Storage and Retrieval System. Computer programs D0001, D0010, B624, and D0095 are documented in the USGS STATPAC Users Guide (see also Sower and others, 1971).

Component 2: Areal and temporal variations in stream temperatures

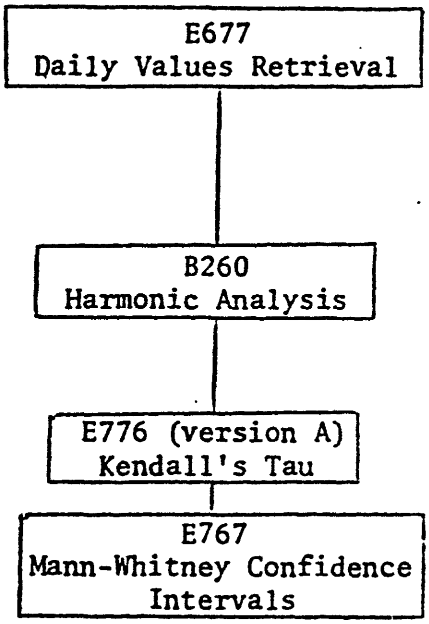
Stepwise procedure of the analysis:

1. Selected stations for inclusion in the assessment (based upon criteria for component 3)

2. Retrieve available daily records from WRD Daily Values File (statistical codes 01, 02, 03, or 11; daily maxima, minima, mean, or instantaneous values, respectively, depending upon station record) (appendix B-1)

3. Edit station records and process through harmonic-analysis program; update or edit further if necessary

4. For trend analysis, process annual harmonic coefficients for each station period of record through statistical programs E776 and E767



5. Summary results of analysis, utilizing harmonic coefficients

   a. Annual harmonic-analysis results (appendix E)

   b. Areal station summary--see table 4

   c. Time-trends--see table 5

Notes: Computer program E677 is documented in the operating manual for the WRD National Water Data Storage and Retrieval System. A draft computer-program documentation for B260 is available. Presently, operation of computer programs E776 and E767 presently is not documented, and they were developed specifically for this assessment.

Component 3: Long-term changes in streamflow chemical quality

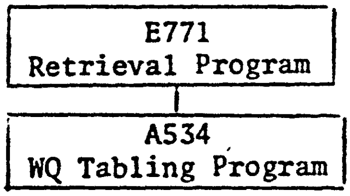
Stepwise procedure of the analysis:

1. Selected stations for inclusion in the assessment (see section on station selection).
   Criteria:

   a. Minimum of six years of record having data amenable for computing annual summary statistics.

   b. Data available in computerized form (supplemented by published annual summaries when and where available).

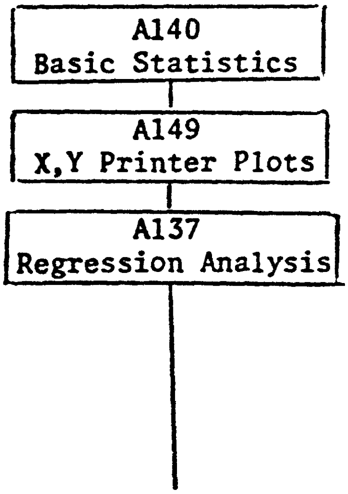
2. Retrieve available station records for selected variables (see appendix F) from WRD Water Quality File; display in tabular form with annual summaries.



3. Supplement step (2) with annual summaries that have been published or that may be computed.

4. Code punch, and edit collected data from steps (2) and (3) (appendices B-2 and F).

5. Process annual records for each station through the indicated sequence of data-analysis programs; include editing procedures.



6. Summarize A140 results (appendix E) to compare with areal summary (see component 1 and appendix D).

Component 3.--continued

7. For trend analysis, process annual mean discharge and specific conductance values and regression residual results (appendix G) for each station's period of record through statistical program E776 (tables 6-9).

E776 (version B) Kendall's Tau

Notes: Computer programs E771 and A534 are documented in the operating manual for the WRD National Water Data Storage and Retrieval System.

Computer programs A140, A149, and A137 are documented in a NTIS Computer Contribution report PB-222 777 by Steele (1972).

Operation of computer program E776 presently is not documented and it was developed specifically for this assessment.